A 000 616 844 7
UC SOUTHERN REGIONAL LIBRARY FACILITY

"Right Mixture makes good Mortar."

THE THEORY AND PRACTICE OF RATIONAL BREEDING.

lifornia
ional
lity

EVERETT MILLAIS.

LIBRARY

UCSB LIBRARY
X-58447

GEORGE H. MORRIS,
58 CHESTNUT STREET,
EAST ORANGE,
N. J.

THE THEORY AND PRACTICE OF RATIONAL BREEDING.

Digitized by the Internet Archive
in 2007 with funding from
Microsoft Corporation

http://www.archive.org/details/theorypracticeof00m

THE THEORY AND PRACTICE

OF

RATIONAL BREEDING.

By EVERETT MILLAIS.

LONDON:
THE "FANCIERS GAZETTE," LIMITED,
54 TO 57, IMPERIAL BUILDINGS, LUDGATE CIRCUS, E.C.

CONTENTS.

CHAPTER I.

PAGE

ORIGIN OF LIFE, AND ITS RISE TO ORDERS, WITH THEIR SUB-DIVISIONS 1

CHAPTER II.

CAUSE OF VARIATION—HEREDITY 8

CHAPTER III.

TYPES OF A UNIT—NATURAL TYPE—MAN'S "CORRECT TYPE"—RESIDENCE OF TYPE—VALUE OF TYPE ... 14

CHAPTER IV.

ARTIFICIAL SELECTION—THE ORIGINAL UNITS OF DOMESTICATION AND THEIR RISE, AFTER THE APPEARANCE OF RATIONAL MAN, INTO FAMILIES, STRAINS, VARIETIES. 22

CHAPTER V.

THE TYPES FORMED BY THE EQUAL-FACTOR SYSTEM ... 29

CHAPTER VI.

THE TYPES FORMED BY THE UNEQUAL-FACTOR SYSTEM ... 36

CHAPTER VII.

PAGE

RESULTS OF CARRYING THE UNEQUAL-FACTOR SYSTEM TOO FAR—IN VARIETIES, STRAINS, FAMILIES, AND INDIVIDUALS 44

CHAPTER VIII.

INTRODUCTION OF FRESH BLOOD INTO DETERIORATING VARIETIES, STRAINS, FAMILIES, AND INDIVIDUALS ... 52

CHAPTER IX.

STRENGTH REQUIRED IN THE GREATER FACTOR TO PRODUCE GOOD TYPE IN VARIETIES, STRAINS, FAMILIES, AND INDIVIDUALS, AND A BREEDER'S AXIOM AS TO HOW THEY MAY BE PRODUCED 59

CHAPTER X.

TRUE SPORTS AND PSEUDO-SPORTS — THEIR ORIGIN AND PROPAGATION 68

CHAPTER XI.

VALUE, USE, AND REDUCTION OF PEDIGREE 79

CHAPTER XII.

THE RISE OF A UNIT TO A STRAIN, AND THE PRECEDENCE OF THE FAMILIES IN IT 85

CHAPTER XIII.

RATIONAL BREEDING 90

INTRODUCTION.

In 1886, after having been a breeder of basset-hounds for some fourteen years, during which time I was an exceedingly close observer of the results brought about by the crossing of individual hounds of the same family, of hounds of differing families, of hounds of differing strains, and accidental alliances of basset-hounds with other varieties of the species Dog, I produced—being firmly convinced that there was some reason for the differences in individual, family, strain, and variety types of the species, deterioration, degeneration, difficulty in rearing, and, finally, non-reproduction in the breed—a small work for the purpose of giving the reasons for the above, and for the additional purpose of showing the members of the Basset Hound Club how a better result could be obtained.

This small work was brought out, or at least the principles on which it was based, by the *Chasse Illustrée*, in three articles written by Mons. E. Frechon, who, having studied its scientific basis, says :—

"It is in the formation and application of these rules that the English have become, and have remained, so far as breeding is concerned, our masters.

"Whereas we in France leave everything to luck, awaiting some fortuitous and unforeseen circumstance to produce superior types in a breed, over there (England) they have for ages modified the laws which regulate crossing. They have, I might almost say, 'weighed' the exact proportion of blood necessary to be added, through several generations, to that of some celebrated individual, so as to ensure in the end his type and attributes.

"Yet, notwithstanding pedigrees and the like, we, on the other hand, unfortunately for us, continue to breed, trusting to luck, the outcome being, of course, that our produce is invariably destined to be inferior, and therefore beaten by the produce of rational breeding, of breeding reduced to a system of algebraical formulæ. Yes, formulæ at which we may laugh, but a system, nevertheless, which furnishes, nineteen out of twenty times, field prize winners, champions on the show bench, celebrities on the turf, and prize winners at the agricultural meetings."

Such, then, are Mons. Frechon's views, and he has put them before his countrymen more in the manner of an Englishman than any one else. They are straightforward enough even to bluntness.

At the same time I think the writer has considerably over-estimated Englishmen; nor is England quite such a breeder's Utopia as Mons. Frechon would have his fellow-countrymen believe.

The number of breeders in England is far greater than abroad, as may be seen by the greater support all shows have, and the greater number of exhibitors. In fact, there is scarcely an Englishman who has half an acre of ground who does not breed some stock. On the other hand, I am certain the percentage of men who breed with no object, and trusting to luck, is quite as large here as it is in France.

I most thoroughly endorse, however, Mons. Frechon's concluding statements, and they are amply justified when I say that every winning basset-hound at the late Agricultural Hall Kennel Club Show was bred upon my system, and five of them by one exhibitor who has followed my views.

These hounds were the result of crossing two differing strains and then inbreeding to one of them. I advised another cross still; nevertheless, even without that, they are good enough to win. In my small work on these hounds, I have said I had the luck to have a beginning. In a work of this kind, however, there is practically no beginning, unless one goes back to the very commencement of all.

When we observe Darwin's experiments on the blue rock pigeon, and how from it by selection he produced most of the common varieties of our domestic ones, we cannot help being greatly struck with the fact that if one of the domestic pigeons, as Darwin has proved it to be, is a variety of the common blue rock, then the common blue rock is a variety of something else. Gradually then, by a system of retrogression instead of progression, we must arrive at the original unit of life—and this is exactly where I have found it necessary to begin a work of this kind.

To many the name of Darwin conjures up visions of human monkeys, men with tails, to others the destruction of Faith and the disbelief in a Deity. To this I will refer, but at the same time I must confess I fail to appreciate any vision of this kind. To me, Darwin's theory is the stupendous work of a stupendous mind, and, in making use of it as the base of this book, the reader will agree with me that it is the only theory put before the world that will satisfactorily account for the multiplicity of life-forms at present extant, and the variation which is constantly going on in nature, whether the reader be a student of nature or not.

Now, without going into the question of whether men were descended from monkeys or *vice versâ*, neither of which is correct, let us for a moment look on the other side of the question—the religious aspect. It is the habit of many to cavil at Darwin, to urge that his writings tend to annihilate religion, to sweep away the religious truths as presented to us in the Bible.

In consequence of this there are a class of people of so narrow an intellect that they will inform you that Darwin's works are unfit to be in the hands of Christian men and women.

Might I not say with equal truth that there is a class of Christian men and women who are unfit to have Darwin's works in their hands.

Again, there are classes which variate in their appreciation of Darwin; they accept a certain amount, but stick at the descent of man. Might they not just as well accept it all? No, they say, "it is not in accordance with the Word of God."

Now if we look at the question without prejudice, which many cannot do, since they believe Darwin's teachings impious, the reason is not very indistinct. It is simple want of power of intellect —a want of education.

It is not in the power of the mass of mankind to understand his work. Look what it means, the intimate knowledge of some half-dozen "ologies." How many have this necessary education. Why is it that the scientific world accept Darwin's theory, and the unscientific refuse it? Plainly because the former have the necessary knowledge, the latter are without it.

How many unscientific men or women can follow his arguments and comparisons? What period of the earth's structure does the Pliocene represent to them, the Miocene, or the Tertiary? What life-forms do such words as Archeopteryx, Pterodactyle, Eohippus or Protozoon convey to their minds? None whatever.

Can we wonder, then, that Darwin's works are fruitlessly read, misunderstood, and finally misrepresented?

In a recent publication, "The Story of Creation" (Clodd), an effort has been made to put Darwin's theory before the reading public in a shape that can be perused by the unscientific mind; but clever though the author's intentions are, and well arranged as the work is, personally I consider it beyond the range still of many. Now Darwin's theory does not sweep away the history of creation as given in Genesis. I maintain that he simply augments it, and reveals to us that the six biblical days and nights, during which creation from chaos to man was effected, were nothing more than cycles of time, during which periods there was a gradual variation and change going on, a progressive movement from an original life-form, whatever that might have been, until it culminated in the advent of man in the sixth of these periods.

This definition of day and night is one now practically admitted by our best informed and most enlightened Churchmen, but does this fact do away with the possibility of a Deity? Not in the least.

It is not my province or intention to enter into the question as to whether life is the result of a Divine power or of natural forces, and in making use of Darwin's theory as the basis of this work I do it simply as a means to an end.

His theory is now the accepted theory of the most advanced and admittedly able scientists of the day; consequently, in dealing with rational breeding, which is in itself a scientific question, it would be most unwise to make use of any other when one so powerful is in our hands.

Personally, I have no hesitation in saying that I accept the

Darwinian theory as the correct one, and if his experiments on the blue rock pigeons are to be accepted as correct—and no one can but accept them—in like manner if our system of breeding can be applied with success to basset-hounds, which is a variety of the species dog, it may certainly be applied just as successfully to any other variety of the same species, or any variety of any other species, viz.: horses, cattle, sheep, pigs, goats, dogs, cats, fowls, ducks, pigeons, rabbits, and canaries, all of which comprise in a large measure our domestic stock.

I have gone as clearly as I possibly am able to into the results of the equal and unequal-factor systems; the cause of deterioration and the means of introducing fresh blood, without sacrificing existing types. I have attempted in a new way to explain this almost inexplainable term, and through a portion of the work I have made use of the basset-hound, the variety with which I am best acquainted, as examples.

In making use of my work, then, or perusing it, I must ask my readers to forget that there is such a variety of hound as the basset, and to substitute for it the variety, the strain, the family, and the individual in which he (the reader) is most nearly interested.

Successful breeding, no one will deny, is a curiously complex question, and its factors are numerous. It comprises the actual mating of individuals, care, attention, rearing, food, training, &c., &c.; but no amount of care or attention, food or training, will cause a unit once born into the world to assume good type and correct points if it is born with bad. I have, therefore, applied myself simply to a series of laws for the production of units of correct type to start with, and I leave care and attention, food and training, to those more able to teach me than I them.

It is an old maxim that it costs no more to keep a pure-bred dog than a mongrel. Why then keep a mongrel? It is a want of knowledge in practical breeding—the want of a rational system—that produces mongrels, whether they be of variety, strain, or family types. In offering, then, this present work to the public as breeders of stock, my object is to show how pure stock of all kinds and of correct type may be bred; and in doing so I must ask my readers to remember that the times have much altered in the last few years. Nearly every variety of stock has now its specialist club. We have a code of points, as well as a type, laid down; competition is more severe, exhibitions more plentiful, judges more difficult to please. To succeed in any branch of life, a man must know his business. To succeed in the exhibiting world a man must know how to breed; and in every pursuit of life, whether it be one of business as a profession, or business as a pleasure, there must be an object in view and a goal to obtain.

The art of breeding, the reader will see for himself as he works through these pages, is not in itself a difficult one to master, although it will be allowed it is a somewhat complex one, and I have, therefore, not gone out of my way to add to it. I have assumed all through that the results of mating will be what we

have a right to expect. Under these circumstances the reader will search in vain my pages for examples of such eccentric results as can be grouped under the head of "mental impress."

Of these we have the following kinds :—

i. Cases in which the female gives birth to progeny which do not resemble the actual sire, but the sire of a previous progeny of the same female.
   Ditto on the part of the male.

ii. Cases in which the male and female, more frequently the female, are affected by external objects—such as other animals, colour, &c.—during the period of coition and conception.

iii. Cases of mental impress during the period of gestation, resulting in malformations from fright, &c.

Into such questions as these I have not attempted to enter. We hear of such cases frequently, principally amongst a class of people who, having no better reason for an eccentricity in nature, at once assume that it is one of these causes, whereas, as will be seen, it is generally due to the introduction of either fresh family or strain blood. Such cases, if they do occur, are the very, very rare exception, not the rule, and in dealing with rules we cannot accept the exceptions, but, as I have done, pass them by as of no object.

THE THEORY AND PRACTICE OF RATIONAL BREEDING.

CHAPTER I.

ORIGIN OF LIFE, AND ITS RISE TO ORDERS, WITH THEIR SUB-DIVISIONS.

I WILL presume that the reader is a man of an observant nature; if so, he cannot look around him without being struck by the profuse differentiation of form under which life has existed, and does so still, upon this earth of ours.

Seldom indeed can we visit an agricultural, dog, poultry, or flower show without hearing the remark repeatedly made, "I had no idea there were so many varieties."

Indeed, a visit to the Zoological Gardens, Kew Gardens, or the Natural History Museum at South Kensington, must cause such an effect on the mind of any man, be he student of nature or totally uninterested in the variety of life-forms to be seen in these collections.

The man who can pass this all by, and not ask himself in some form or other, "What is the meaning of all this?" must be, I'm afraid, of a singularly unenquiring nature.

Be this, however, as it may, there certainly is a reason for the diversity of form that I here call attention to. There was a time when man's intellectual power was lower than it is to-day. There was likewise a period when science had not reached its present state of perfection, consequently there was every reason for man remaining in ignorance, since no practical or rational answer could be given for the multiplicity of forms under which life reveals itself.

Man in these days was content with the Biblical version as given in Genesis, and it sufficed for him to know that there was a period in the history of the world when "all was null and void,"

and as to life, it was created; further than this, man knew or cared nothing.

But nowadays this is all changed. Science has advanced to a high degree of perfection, added to which, man's powers of intellect and habits of observation are increased, and through the theory given to us by the late Charles Darwin, we are now aware of a reason, the only one that will scientifically account for what has taken place since that period in which all was "null and void," and light first broke on original life. This theory is known as the origin of species, a knowledge of which is absolutely necessary if the breeder would desire to understand and penetrate the somewhat complex art of rational breeding.

In attempting then to tell the tale of progression, which has been going on gradually in the cycles of years which have elapsed since the prototype of modern life appeared on earth, I will try to give a brief *resumé* of the origin of species, and also in phraseology as little technical as possible, though it must be borne in mind that, simple as the language will be, I cannot at times help making use of certain technical terms for which we have no equivalent in the unscientific English tongue.

In brief then the following is the theory:

Below the strata or upper crusts of the earth on which we now dwell is to be found a stratum bearing the mark of fire, which is held to be a proof that at some period of the world's existence it could have been nothing more than a vast glowing mass, of such intense heat that no life could under any conditions have existed on its surface. This period is known as the lifeless period of the earth's existence.

Into the cause of the earth being in this condition, it must be obvious I cannot go, since it raises questions which are of no interest to the point at issue.

It is sufficient for us to know that this was the case, and that on the cooling down of the molten mass life appeared, not on dry land, for as yet there was none, but in a waste of waters, the outcome of condensation. I say life appeared, but the cause of its appearance, that is to say, its origin, is the one question which raises a difficulty, and which no amount of argument will, I believe, ever make clear or join the scientific and religious theories.

Now, the great argument, on the scientific side, is that life was due to natural forces; on the religious, divine inspiration. Against the scientific theory the argument was brought to bear that, since organic matter could not be obtained from inorganic, it was impossible that life could have been produced by natural forces. I need not say that science has removed this difficulty, and that organic matter has been obtained from inorganic; wherefore the religious argument against the scientific ceases to have any *raison d'être*. Consequently, the scientific theory stands higher than ever. It would be useless, however, to go into the pros and cons for and against these theories, so let us take a middle course and assume that life arose from natural forces inspired by a divine

power, a course that will meet both sides of the question, since we have to do with life itself and not the origin of it.

It is sufficient for us to know that on the mass cooling down to a sufficient temperature to admit of life enduring on its surface, it appeared as an original germ, aquatic in nature, and from which a new order of things was in due course to be evolved, so terminating the lifeless period and commencing that of the life history of the earth.

Now let us consider the form of this first life.

Nature is always progressive, not retrogressive, consequently it is quite impossible that the first life was a unit of a complex organisation, such as we see surrounding us to-day, therefore it could only be a low form; and not only a low form, but, being the first, it must have been the lowest form of all, but of its actual life-form we know absolutely nothing.

Although, however, the power of forming an idea of its shape is wanting to us, we can commence at the lowest form of life we are cognisant of, and from such a life-form we can gradually work up to the highest, and so form an approximate idea of how this progression has come about.

We must be all aware that life is divided into two great kingdoms—

(I.) The Animal;

(II.) The Vegetable;

every unit of which is of cellular construction; and the cause of differentiation is due primarily to variation, secondly to evolution, questions which must be reserved for another chapter.

Now, as to the epoch at which life so variated as to give rise to these two kingdoms, I will not enter, but will confine myself to the rise of these two branches of life.

It is a noticeable fact that the higher the organisation of a unit we examine in either of these kingdoms the greater will be the variation and complexity of the cells of which the unit is composed.

If, for example, we take ourselves, every function that our body performs has a certain variation of cell set apart for its performance and to do the especial work that it is called upon to do.

What, then, will be the lowest life-form? Obviously that in which all the functions that are required of it have to be performed by a single cell. Consequently the lowest form of life will be a single cell.

With such a life-form we are acquainted.

Commencing, then, with this lowest life-form, the protozoon, we can trace a rise by variation to a life-form composed of two or more cells; then to a multicellular life-form. Then a further rise to a life-form of variated and differentiated cells, and from this to a fish-like form devoid of any backbone; all which are designated, from the absence of backbone, invertebrates. A further rise brings us to a fish-like form with a rudimentary backbone, and then we enter the true vertebrates.

The first of these is a true fish.

Now up to this epoch in progression every life-form has had not only to live in the water, but to obtain the oxygen necessary for its being from the water; but a further rise by successive variations brings us to a fish-like form that can breathe air.

If we now turn to the vegetable kingdom we find exactly the same order of progression, namely the rise of plant life from a plant represented by a single cell growing below the water to one of many cells raising itself above the waters, by which we at once note that the waters on the face of the earth have begun to decrease, leaving it in a more or less swampy condition. Thus it comes about that, by the time variation had evolved the amphibiæ from the fish, the swamps were ready for their reception.

Further into the vegetable kingdom I need not go, but following that of the animal we note a rise from that of amphibiæ to reptiles, thus showing that the earth had now begun to be fitted for the reception of animal life. Then we have a rise from reptiles to saurians, and from saurians to birds.

From the same stock whence the birds came we have a rise to a bird-beast (monotremes), such as the platypus; then a rise to the marsupials (placentals), as typified by the kangaroos; and, lastly, a further rise to the mammalia, the highest of which is man.

Animal life, then, may be thus divided into orders:—

Invertebrates.	1 Unicellular bodies.	All cellular.
	2 Multicellular.	
	3 Annulata.	
Vertebrates.	4 Fish.	
	5 Amphibiæ.	
	6 Reptiles.	
	7 Saurians.	
	8 Birds.	
	9 Monotremes.	
	10 Placentals.	
	11 Mammals.	

Now if we take any one of these orders, and examine it, we find that the units of one order differ not only in form from those of another order, but differ in special attributes, viz.:—

If we take as an instance the order of mammalia we find that they differ not only in form from the next order below them, but in attributes, the placentals giving birth to their young in an immature condition, the mammalia in a mature condition, and suckling them (hence the name). But not only do the units of an order differ in form and attributes from those of another order, but they differ amongst themselves. Vastly, as can be seen when we place side by side a man and a mouse, and for why? For exactly the same reason that one order differs from another, just as the mammalian differs from the placental, by variation. Hence we must sub-divide an order, and the sub-division of an order brings about species, all of which have a common prototype in the first of the order—thus the first of the species of the mammalia was a protomammalian derived by variation from a placental.

Species again, although they have common attributes belonging to the species, differ amongst themselves, and for the same reason they may be sub-divided. Hence we have varieties.

Varieties again may be sub-divided into strains, strains into families, and families into units, the origin of the first family being (as the first of the mammalian was a protomammalian) a protofamilias, which can be only a single unit.

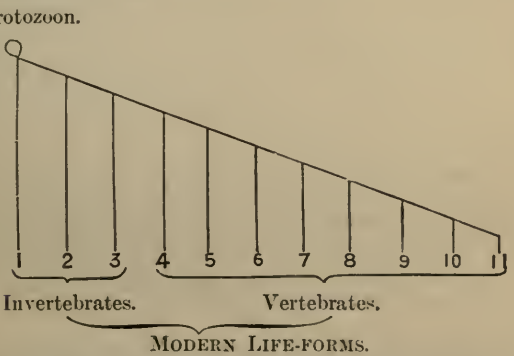
Hence owing to this sub-division we find that a unit must belong to a family of a strain, of a variety of species, of an order of one of the two kingdoms of which life is composed.

From this then we can easily arrive at the progression which has taken place from the cell life-form to the mammalian, of which the highest is man.

The protozoon, a single cell, would in the first place found a family, which by repeated variations would work its way up through strain, variety and species to an order.

From this protozoon order a unit would in course of time variate and in the same way work its way up to a second order, which sequence of events repeated over and over again would finally culminate in a mammalian order such as I have described. Now it must not be supposed, that because life rose in this manner, the lower orders became extinct as progression took place.

All these differing orders, both in the animal and vegetable kingdom, have their present representatives, and exist as food for each other. Hence we have the following problem as representing the gradual evolution which has taken place and contemporaneous orders.



MODERN LIFE-FORMS.

It is numberless species of these orders that have ceased to exist, one of which, the monotremes, have now only one.

Now life as it has risen from the protozoon stage to that of the mammalian resembles a tree, the limbs of which are the orders, the bigger branches the species, the smaller branches varieties, branchlets strains, sticks families, and single twigs units, a tree

from which the limbs, &c., have continually grown in a lateral formation.

Could we see such a tree standing perfect and intact, unscathed by the storms which have raged around it, we should have a bird's-eye view of not only such a hypothetical tree but of every order, every species, etc., that has ever been evolved, and in addition we should be able to trace the present flourishing species back through the antediluvian world and periods before that, to the division between the animal and vegetable kingdoms, and so on to the great prototype of all Original life.

But the antediluvian species would still be in existence were the tree intact, consequently we should have species that now only exist as fossils, and species that would not bear a fossilisation, existing contemporaneously.

Not only would we see this, but we would be able to note the small variation which caused the establishment of each successive order, and the variations which occurred which raised a unit to an order. In this way would it be possible to see how life has progressed from a sexless, nerveless, stomachless, unicellular invertebrate, reproducing itself by division, and propelling itself by contraction, to such an organism as ourselves.

We cannot imagine a more enormous stride than the above. It is so vast and so complex that we can only grasp its full meaning, and the gigantic leaps which nature has taken since the first life-form appeared on the earth through the medium and the doctrine of variation and evolution. But here we must pause. The tree of life is not in this perfect state, such as I have ventured to portray it.

Great storms have raged around it, destruction has overtaken it, circumstances have arisen which have caused its branches—whole species—with their varieties, strains, families, and individuals to be swept away. In certain parts it seems to have been allowed to grow so far, and then a cataclysm of nature has taken place which has broken it down, allowing only the topmost twigs to take root and under a change of surroundings to exist, and to break into new trees *de novo*.

They, in their turn, have risen to grandeur, only to be, like their prototype, destroyed, thus bringing their topmost twigs again to the ground, where they have sprung up under differing circumstances anew, leaving not a trace behind them of their own birth, their parent tree, or the great prototype of them all.

We therefore know no more of that portion of the world in which life began than we know what its life-form was, or how it originated.

If we attempt to trace back the present trees, which we look upon as species, we find ourselves brought to a sudden, even an abrupt stop; we are arrested in our investigations, for the simple reason that, owing to the catastrophes that have overcome the parent trees of which they are but the topmost twigs, we are quite unable to follow them back.

It is only owing to the researches of modern science, aided by the testimony of the surface of the soil upon which these many species now flourish as trees, that we are in any wise able to form an idea, such as I have given, of the descent of present life-forms and of the aspect the parent tree of all would have presented had it not been overthrown and destroyed.

The fossil remains, both animal and vegetable, which we find in the strata in a definite and progressive order, give to us Darwin's theory, such as I have attempted to place before my readers. The differing life-forms now existent are but the fallen boughs of previously existing species, and it is through this fact that we have any notion of how present life-forms are derived from an original unit "life."

The gradual development of man brought about a gigantic change in the varieties of some of these life-forms. In his early state he could have been nothing more than one of them too—nothing more than a brute beast, of superior cunning and intellect to those other species surrounding him. Gradually he rose to a distinct species—into a rational being, when with such an endowment he became their master and held dominion over all units below him in a lower state of progression. But until this epoch in the history of the world—that is, from the first appearance of life as a form on the earth down to the life-form Man—all differing life-forms were due, were the outcome of variation and necessary evolution, all taking place under a system of natural selection, and totally uninfluenced by the hand of man.

The number of separate trees or species is at present enormous, and they are composed as follows :—

1. A great number of individual units which form separate families ;
2. Which families form strains ;
3. Which strains form varieties ;
4. Which varieties form one species or a tree ;

each individual having his own particular life-form, each family, each strain, each variety, and each species.

In conclusion, then, we may deduce the following facts :—

1. That ever since life appeared there has been and ever will be a tendency to variate ;
2. That up to man it was due to natural causes ;
3. That species consist of varieties, strains, families and individuals.

CHAPTER II.

CAUSE OF VARIATION—HEREDITY.

To understand the gigantic progression which I have outlined in the preceding chapter over an expanse of time too far-reaching for our limited minds to comprehend, we must look to variation and evolution. It is a curious fact that it is nature's habit never to make two things exactly alike, whether they be animal or vegetable units. Low or high life-forms, there is an individual difference of form in some way or another; were it not for this we should see exactly similar objects, which we do not. They may be very very similar, the variation between them may be even microscopic; but there is a difference which does and must exist.

Before, however, proceeding further, let me draw the reader's attention to the result of variation on a single unit, since he will have a clearer idea at the outset of how variation leads on to evolution, and consequently how the complicity of life-forms has been brought about, viz. :—

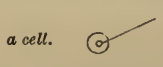
Variation on one unit creates two or more, viz., a family.
,, on a family ,, ,, ,, ,, a strain.
,, ,, strain ,, ,, ,, ,, variety.
,, ,, variety ,, ,, ,, ,, species.
,, ,, species ,, ,, ,, ,, order.

By the time, however, that an order is reached we have completed evolution.

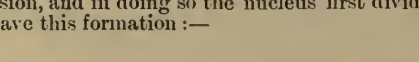
Let us now commence again with the same form of life we did in the preceding chapter, viz., a cell.

Now, a cell is sexless, and, being so, it must be obvious that parents are not required for its reproduction as is the case in the higher life-forms.

The process by which fresh cells are formed is curious, and may be followed by the accompanying illustration :—



Now, when the cell reaches adult age it commences reproduction by division, and in doing so the nucleus first divides into two. Hence we have this formation :—



Gradually the cell wall contracts, until we have an hourglass arrangement, in the bulbs of which is a nucleus, and then entire division takes place, when we have two single cells. Why this should happen we do not know, it is the secret of life.

The birth then of these first two cells from a single one was the first family—a variation on an original unit. Fresh division in these two new ones would lead to four, and eventually an enormous number of similar cells—all belonging to the same family, the only difference between them and the original cell being that of individuality. This then is an instance of the variation of which I speak at the commencement of this chapter.

It must be obvious, therefore, that had there been no other form of variation, even after all these years of time, since life began, the world of to-day would not be such as it is. On the contrary it would simply consist of an enormous family of unicellular life-forms, of identical family form, and differing individuality, founded on the individual form of the first cell.

Consequently we have another kind of variation to deal with, viz., that due to necessity.

To understand how this new change came about, we must look at the matter in the following light:—

This first family of cells must have had certain surroundings, must have existed under certain circumstances or environments as Darwin calls them.

Now supposing that these environments had remained for ever the same, that is to say, never changed, then for ever would the same family form in the cells be produced; but if a change came in their surroundings, then those units of the family which resided in the area affected by the change would either have to *variate* to adapt themselves to their novel environments or perish.

Hence we have variation due to adaptation.

The result of this would be that we would have the formation of a second family form, built up on the individual variation of the first unit of family No. 1, that adapted its life-form to the change of environment, and the original cell of all would now be represented by a strain of two families, each with a separate family life-form, separate individual life-forms, and a common strain life-form.

For a similar reason the new strain would variate, and as a result we should rise to a variety, a variety to a species, and finally a species to an order.

On reaching this point we observe evolution to have been effected; that is to say, from a single cell an order has been evolved, and this order may be thus illustrated:—

Single individual	Differing individuals of differing families	Differing individuals of differing families of differing strains	Differing individuals of differing families of differing strains of differing varieties	Differing individuals of differing families of differing strains of differing varieties of differing species

Which species form an order of sexless unicellular life-forms, with the common attribute of reproduction by cell division.

Variation now commences on this order, and as a result by a similar state of progression we arrive at order No. 2, viz., an order of multicellular sexless units with the common attribute of reproduction by single cell division, which single cell commences to variate to a multicellular life-form as soon as it is divided off from the parent life-form.

Gradually then in this manner we climb up the orders in progressive order, each order as it is formed adding a fresh variation to its common attribute, till we reach the last order, viz., that of the mammalia, whose complicity is but the outcome of continual evolution.

This last order has succeeded to the variations and evolutions of all the orders that have preceded it, and naturally that of its own, consequently we have in the mammalia an order of high sexual life-forms, with the common attribute of reproduction from a single cell, which single cell gradually commences to variate as soon as it is fertilised. Let us take an instance:—

Individuals.	Family.	Strains.	Variety.	Species.	Order.
A. B.	Fino de Paris.	Couteulx.	Basset.	Dog.	Mammalia.

Now on coïtion between A and B conception follows, which means that a cell (it generally is several cells) is fertilised, an exactly similar cell in form to the primary cell of order No. 1, rapid division in this cell follows, then variation in cell form, gradually it passes from an invertebrate to a vertebrate, from a sexless condition to one of sex, from a single cell to a mammal, being finally born into the world in a mature state of development ready to be suckled, being of the Dog species, the Basset variety, the Couteulx strain, the Fino de Paris family, but not as individual A or as B, but as $\frac{A.B.}{2}$ the likeness of both parents.

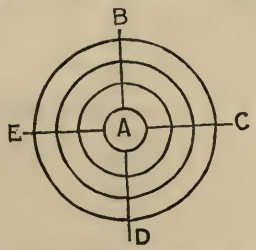
What does such an illustration show us? Comparatively that during the period of gestation, in this case sixty-three days, nature has reproduced all her variations and evolutions, evolutions which have in the first place taken time beyond the intelligence of man to bring to a state of perfection, from the simple cell to the mammal, in the incredibly short period of nine weeks.

Variation, however, which has at length culminated in complete evolution, shows us something more, viz., the reason that one species of an order will not breed with another of the same order or one of another order.

For example:

Let A represent the prototype of an order C, B, D, E, variations

from A, which commencing at A gradually pass the family strain variety, culminating finally as species of an order, viz. :



As long then as the units belong to the families, strains, and varieties of A, as marked by the three enlarging circles round the prototype, then they will breed with A and amongst themselves, but by the time they variate into species they have become so differentiated in form and habits that they have neither the power nor desire to breed together.

Thus, if we look upon the Eohippus as the prototype of the modern horse, donkey, and tapir, we can understand how, as long as they were simply differing families, strains, and varieties of Eohippus, they would breed together, and with other varieties sprung from the same common stock, at first easily, then, as they rose, with difficulty, as is to be seen nowadays in the case of the horse and donkey, and finally, not at all, as in the case of the species Equus and Tapir, they having become differing species.

But variation points to something more than all this, it gives us the clue to heredity, or the power all units possess of passing on to their progeny their attributes.

If we go back to the first page of this chapter, it will be noticed that I mention a difference which exists in every life-form nature produces, and to this I may add every life-form which man causes nature to produce. This difference is that of individuality, an attribute which no two units can have in common. Why this should be I do not know, but it is so, and breeders should at the outset bear this in mind.

Now if we turn again to the lowest of the orders, the Protozoon, and take the prototype of it, the primary cell, we will observe that when it at the outset divided itself into two, it handed down to its halves ; what ? its likeness ; not as a whole to each, but half. Each of these new units then had an individuality of its own, and a family likeness to each other, founded upon the individual personal appearance (not individuality) of the first. This and the attribute of reproduction by cell division was the whole hereditary gift of the first unit to its progeny.

The offspring—that is to say, the first family—in like manner passed on to their progeny the same hereditary gifts, but in addition the family life-form.

Variation, however, due to adaptation, raised the families to the

dignity of a strain, which variation became added to those in which it had occurred.

Gradually in this way heredity was added to, until the first order was evolved, by which period the hereditary powers of a unit of the order may be thus represented.

The power of passing on—

Half its personal life-form,
,, ,, family ,,
,, ,, strain ,,
,, ,, variety ,,
,, ,, species ,,

to each of its halves.

But as we have seen each of these halves eventually grow into a whole, eventually we should have two new cells having the whole personal appearance, family, strain, variety, and species appearances of the first with a differing individuality to their parent, and with the common attribute of the order they belonged to.

It is for this reason that units of sexless orders resemble one another so minutely.

When, however, we come to deal with units of the higher life-forms, we observe the reasons for a greater difference in personal appearances.

In the sexless orders a unit divides into two halves, which eventually become wholes.

In the sexual two units divide to make a new whole or wholes.

In other words, one-half does not grow into a whole—it requires two.

But the hereditary powers of units of sexual orders are just the same as those of the non-sexual ones. They pass on to their offspring—each unit a half, and the two form a new whole with a differing individuality.

Now, if we turn again to the illustration I gave of the basset-hound, we see at once the reason for AB being of the Fino de Paris family and the Couteulx strain; it was because both parents were of the same family and the same strain, the only difference existing between AB and A and B being personal, and between AB and his brethren, if he had any, being individuality.

Species life-form must be the same, as only units of the same species can breed together.

Such is an instance of heredity under the most favourable circumstances; if we, however, require it more fully explained, let us take the instance of breeding together a horse and a donkey, viz. :—

	Sire.	Dam.	Produce.
Individual	A	B	Ab.
Family ...	C	D	C D.
Strain.....	E	F	E F.
Variety ...	Horse ...	Donkey.	Horse-donkey = Mule.
Species ...	Equus ...	Equus ...	Equus.

In this case both parents have passed one-half of their personal appearance, family, strain, and variety life-forms to the new unit which we call a mule—in other words, a composite—the only form which it has in common with its parents being that of species, to which they both gave two halves which were similar.

It is for these reasons that we may have pure or composite family life-forms, strain, and variety in the higher life-forms, and not so in the lower, and it is for the same reasons in the higher life-forms that personal appearances must always differ, because it requires two individuals to form one or more new ones, and it is because of individuality that these latter differ too.

In conclusion, then, we may say that adaptation is the cause of variation, evolution the result of continual variation.

That every unit has the power of heredity, and that—

Species form is always pure.
Variety pure or a variation.
Strain pure or a variation.
Family pure or a variation.
Individual form always a variation.

CHAPTER III.

TYPES OF A UNIT—NATURAL TYPE—MAN'S "CORRECT TYPE"—RESIDENCE OF TYPE—VALUE OF TYPE.

WE have already arrived at the conclusion that there are species, and that species are divided up into varieties, which varieties are composed of strains, the strains of families, and finally, the families into individuals.

Again, we have seen that every individual must belong to a family, of a strain, of a variety, of a species.

When, then, we describe a unit, we also describe the family, strain, and variety of the species he belongs to, viz. :—

Individual	Fino VI.
Family.....	Fino de Paris.
Strain	Conteulx.
Variety	Basset-hound.
Species.....	Dog.

And unless we describe a unit thus, we give but a portion of his description.

It is clearly evident, then, that each of these differing variations a unit belongs to has a distinction, and must have some peculiar appellation given to them, that there must be some distinguishing feature in them, and to them has been given the word "type."

Hitherto I have continuously used the word form for convenience' sake, now I must make use of the word type as applied to a life-form.

Now this word "type" is a standing cause of quarrel, and when exhibitors commence an argument on the respective points of the exhibits, and the word type is imported into the argument, it generally finishes in an argument on the definition of the word "type," irrespective of the original question.

So much has been written on it, and it is at all times such a vexed question, so frequently misapplied and so commonly misunderstood, that I am sure a chapter on it alone will not be out of place, since if a man is breeding for "type" he must necessarily know what "type" really means. Were it not for this latter necessity I should think twice before I began upon "type;" but notwithstanding that it is a sort of standing dish in its way, I shall attempt it anew. At the same time I shall try the task of explaining it in a totally different way to what has been pre-

viously attempted, and in doing so I shall, as many another has done, try to explain it correctly.

Nevertheless I must candidly admit that the word "type" is a difficult one to define; it is a word of considerable subtlety, and very doubtful if a benefit; but we have only to thank the paucity of the English language that it is so, and that it remains to us as a bugbear and a pitfall to many. In one word, "type" means "form."

Now, if we look at Fino VI., the first form or type that produces an effect on our mind is that he is a dog (species), next a basset-hound (variety), then a Conteulx (strain), then a Fino de Paris (family), and lastly, his own peculiar characteristic (individual).

He, therefore, has five types, or distinctions, by which w recognise him.

Now, to prove that these five types do exist, I will proceed to demonstrate as follows, viz. :—

Species Type.—Compare the species type of Fino VI. with any other species—man for instance—only a madman would fail to observe the difference in the two forms. Directly we see a man and a dog together we instinctively say one is human type, the other canine. It matters absolutely nothing whether the man be a prince or an East-end cadger; the dog a champion bloodhound or a ratcatcher's mongrel, the species type between the two is extreme, and we cannot help acknowledging it.

Variety Type.—Just then as species differ, as two forms of life, we have the same difference in two or more varieties of one species. No man, notwithstanding that he does not even know the names of the two varieties, can help observing the difference of variety type between Fino VI. as a basset, and Moonstone as a retriever. They both belong to the same species, but they differ in variety as, is commonly said, chalk from cheese.

Strain Type.—Again a difference, but we require a finer perception to see it. Fino VI. belongs to the Conteulx strain, Champion to the Lane; they both belong to the same variety and the same species, yet no man who pretended any knowledge of the breed would mistake one strain type for the other or fail to note the difference.

Family Type.—Still a difference in type, but smaller than the last. If we compare Fino VI. as an example of the Fino de Paris, with Chopette, an example of the Termino family, we note a difference between them, notwithstanding that they have three types in common, viz., strain, variety, and species.

Individual Type.—Here again exists a difference in type, but it is necessarily very small.

Darwin most truly points out that no two leaves of the same tree are identical, no matter how much they may appear so to the common eye. Again, no two sheep in the same flock are exactly similar, although people can be found who fail to see a difference. To go even further, every grain of sand has its own individual type, whilst, if we should desire a still more minute example,

no two hairs of one's head are similar. If we place them under the microscope and examine them, there will appear to the microscopist's eye as much difference between the two as the ordinary mortal will see between a photograph of Windsor Castle and one of Buckingham Palace.

But to take an ordinary example, look at two pins, one black, and the other white. Both are pins, but no one, unless he was totally colour-blind, would fail to observe a difference.

Such being the case, if we compare Fino VI. with his own brother Texas Fino, we observe a difference of individual type; both have family types, strain, variety, and species in common, but the difference between them is in markings, size, &c., all of which make up individuality.

I think then that now my readers will agree with me that there are five types, and that Fino VI. has them all.

Up to this point I have arrived at showing that there are five types. Now, it is my purpose to show that three of these five may be composite types equalling whole ones, viz., my basset hound "Joyeuse."

Individual	Joyeuse.
Family	$\frac{\text{Fino + Ramono.}}{2}$
Strain	$\frac{\text{Couteulx + Lane.}}{2}$
Variety	Basset Hound.
Species	Dog.

Now, if we compare her with Fino VI. we see that she has only two types in common, species and variety, and that she differs in strain, family and individual types.

Again, I might give an instance of a unit that only possessed one type in common with Fino VI., viz. :—

$$\frac{\text{Basset + Spaniel.}}{2}$$

We should call this a mongrel, nevertheless it would have species type in common with Fino VI., though it differed in variety, and consequently in strain, family, and individual types.

It follows then that a unit may have four types in common, three, two or one, but no unit can have five types in common, because no individual can possibly be exactly the counterpart of another.

Again, a unit may have three composite types—variety, strain, and family; but species type he cannot have composite, as no two species will breed together; nor can he have a common individual type with another, since his must be different to every other individual's.

We have now arrived at the conclusion that a unit may have five whole types, or that three of them may be composite; the question therefore which must next arise is which of the two is correct, or what is "correct type."

Now, to understand this question, we must look on the above in another light altogether. Naturally there is no such thing as "correct type," it is an invention of man's mind, undoubtedly, a manufactured phrase to aid the breeder (as well as confuse him?).

Now, supposing for a moment that we placed ourselves in the position of a man who is not a breeder, and who knows absolutely nothing about types, a man who has no interest in the question at all. What would be correct type in species, varieties, strains, families and individuals to that man, viz. :—

Species Type.—If I gave as an example of species man and dog, the religious question would at once come in, since a religious man would at once say that man was the correct type, that he was fashioned in the image of the Creator; but if I gave instead the dog species and the cat species, there would be no question of such a kind raised. What man would dare to commit himself to the statement that a dog as a life-form was better than a cat? He might prefer the dog certainly, whilst his grandmother might do the same with the cat, but the question of one being correct and the other incorrect would resolve itself into one of personal taste.

It must, therefore, naturally come about that neither the dog nor the cat are correct type as species, one is just as good as the other.

Variety Type.—Here I give two whole types and one composite, viz. :—

The basset, the retriever, a half-bred basset and spaniel.

Again the question simply is, which do you like best? All are life-forms, one is just as good as another, the two pure-bred ones and the mongrel.

Strain Type.—Ex Conteulx. Lane (pure). Conteulx + Lane (impure).

Family Type.—Fino de Paris. Termino. Fino de Paris + Termino, ditto.

Individual Type.—Fino VI. Chopette. Joyeuse, ditto.

Now, in the above instances, whether it be species, variety, composite variety, strain, composite strain, family, composite family or individual, which must be a composite, in whichever way we look at it, it is a pure matter of taste, but as a matter of fact no species, &c., as a type is better than any other or more correct.

Look at it in this way, I might say I liked roast rabbit, you on the contrary might say boiled rabbit; who is to decide which is the proper or correct way to cook a rabbit? Undoubtedly both are equally good.

Any species then is correct type, any variety composite or not, any strain or composite, any family or composite, any individual. The fact is, the whole question is one of "Which side do you like your bread buttered?" Without any guide, if we try to compare types as species, &c., we fail, and come to the conclusion that there is no correct type in any of them.

The first type, and, therefore, what we might if we chose look upon as the only correct type, was the type of the great proto-

type of all, and the complication that exists now is but the consequence of it. For this reason, then, every life-form in the world, be it the most beautiful or the most hideous, has its own five types or composites, and whatever they may be they are as good as any other life-forms. Everything then naturally is good type, there is no such thing as bad type in nature. Type variates as the units variate, consequently the units and type must journey together, and as the units of to-day are very differing from their prototypes, type is for ever in a state of evolution too. Type, therefore, never can be correct for any length of time, for it must continually be in a state of change.

In conclusion, then, we may prefer a cat to a dog as a species, a basset to a retriever or a mongrel, the Conteulx strain to the Lane or a mongrel strain, the Fino de Paris to the Termino or a mongrel family type, or the individual Fino VI. to Fino V. or Joyeuse, but naturally, putting man out of the question, none are good or bad type; all are equally good, as life-forms or types of life, and correct.

How then is it that there is such a thing as "correct type" if naturally it does not exist?

Byron, speaking of man in reference to the sea, says that he "the vain title take of lord of thee and arbiter of war." If we substituted "type" in place of "war" it would be a somewhat gross parody, but still this is exactly what man does do. He makes himself lord of type and defines it; but man does not go far enough in his definition, as I shall presently show. Now, if my reader be an elderly man, he will remember that before the institution of shows and exhibitions of live-stock, every little squire, every breeder, no matter what his special line was, thought his own stock the "correct type." Where are all these differing types now? A few have been taken up and exist as large breeds now; but the rest? They have disappeared. Where are—to go a step further—the Talbots, the Wolf-hounds, the turnspits? They are gone. To come to a later period, where is the heavy old pointer? Out of date. These were all correct type in their day. Why, then, are they no longer so? Because the use for the Talbot, the Wolf-hound, and the turnspit has gone, and in their place we have new types, the staghound, the Scotch deerhound, and an automatic machine. As far as the old pointer is concerned, there was no better dog in his day, but variation in sowing the fields he was used in has brought about a change in him too. In those days there were no furrows; now furrows exist, up these the birds run, and the pointer of twenty years ago is not fast enough; consequently a new type of pointer has been manufactured. "Correct type," then, is what suits the times, and the correct type of a life-form is what we make it to-day, but we cannot insist that it shall be the same one hundred years hence. In all probability the correct type of to-day will be forgotten.

Let us see then which types man can change. It is obvious he cannot change species; but from a variation he can make a new variety. He can form new strains, fresh families. Individuals he

cannot change, since individuality is born and dies with its owner.

Species type is, then, limited, and change in it is the work of cycles of years of evolution; consequently, as far as existing man is concerned, it is at a standstill. Variety, strain, and family type are practically changeable. Individual type is, as Byron says of the ocean, "boundless, endless, and sublime," never the same and under no command.

Yet, although man is aware of this, or should be so, he sets to work to define "correct type." Now, do not think because I sneer at his doing so that I think he is wrong. What I am thinking of is, that when a man defines his notion of correct type he imagines that it is going to last for ever. It will not, but it will last just as long as it is convenient for those of his day, and, if suitable to those who come after him, a little longer. "Correct type" is manufactured in this way. Supposing that man agreed that the species dog was the correct species type, and that the basset-hound was the correct variety type, and that the Couteulx strain was the correct strain type, and that the correct family type was the Fino de Paris, and that the correct individual type was Fino VI., then Fino VI. would be the only correct life-form in the world.

Thus "correct type" would be most clearly and accurately defined; it would no longer be a question of taste, since every one was agreed; consequently the quality of every other unit in the world, whether he has good type or bad type, would depend entirely upon how nearly he approached, or how far he differed from, the acme of perfection Fino VI. It is needless to say that man does not draw such a sweeping conclusion as this, since it is evidenced by the fact that we cultivate a variety of species, &c., &c., all of which have their "correct type," and man leaves to his compeers the individual choice of what species he shall cultivate. Man proceeds as follows, nowadays :—A certain number interested in a variety form a club and lay down certain rules for their guidance. Amongst these rules the type of the variety is defined, and the points of the variety.

Now, I hope I shall make it clearly understood that "type" and "points" are not analogous terms, but are separate and distinctly different. For instance, a basset-hound may have its variety type, but it may not have the points; it is here that men fail in understanding the word "type." Type and points run, as it were, in couples, but "type" is not points, or points "type," and the consequence is that in arguing upon a question of points, in walks the dreadful word "type," and the real question at issue comes to a sudden and abrupt conclusion.

As an instance of this we may safely say that Fino VI. is in all types perfect, but he is not absolutely perfect in points.

When, then, they have come to a decision on the type of the variety, the variety is judged by their own judges, and, no matter whether they be right or wrong, the type laid down by the club is the correct type and none other.

It will be now evident that they acknowledge two correct types

—species and variety; but since strain, family, and individual type are not taken into account, what man calls "correct type" is not "correct type" at all. It is here that man fails in his definition; he does not go far enough.

Having defined the species type, which cannot be a composite—having defined the variety type, which might be a composite, but which he rightly does not allow—he leaves it an open question as to what strain is correct type, what family, what individual, or what composite strain or composite family.

It must be then clear that, having laid down the variety type and the points, he leaves it open for perfection to be reached by differing strain types, differing family types, and differing individual types. They cannot all be correct type, and therefore the strain, family and individual types become matters of taste, and you cannot argue that one is better than another. There is no means of settling which is correct type under the circumstances. Were type actually defined, such a hound as Fino VI. or any other with pure types would be "correct type."

The result of this incorrect definition of "correct type" is that in competition you see two or more strain types, composite strain types, to say nothing of family and individual types; consequently, if the judge have a preference for one strain, one family or one individual type over another, there is no question as to which the prize will go to, and if you ask for the reason, the answer will be that the other strain, composite strain, family, &c., is not correct type. It must be obvious to any thinking man that this must be wrong, since, as long as strain and family type is not defined, one is just as good as another, and that it is a question of personal taste.

These are the objections that I have to what is termed "correct type."

In a late number of the *Kennel Gazette* I advocated a model, of an ideal variety type, in addition to a code of points, considering that such a visible definition would just as easily be agreed upon as a written description. My opinion is that with it every breeder would have the same object in view, namely, the reproduction in life of the model form. Thus, only two types would be required, and these could be termed "correct type"—viz., species and variety—and it would be open to the breeder to make use of any strain, family, or individual types to reach the desired standard of excellence. In this way the question of strain, family, and individual types would be done away with, but until these halcyon days arrive, we will have to recognise five types and put up with an incorrect "correct type."

Again a good deal of difference exists in where we should look for these types, and most authors agree that it is in the head. The reason that this difference exists is that the authors do not understand that there are five types, owing to the custom of using the word "type" in the singular. It would be a lamentable thing if we saw something in the distance, and had to go up to it and look into its face to find out and satisfy ourselves that it belonged to the species man. On the other hand, if you wished to make absolutely certain that it was Mr. Smith you would have

to do it, in order to satisfy yourself of the individual; for these reasons we look for type as follows, viz. :—

In species, the entire life-form.
In varieties, the shape, coat, colour.
In strains, the colour and minor attributes.
In families, the head and colour, and minor attributes.
In individual, the head, colour, and individual attributes.

Now, as there are five types, one must be of greater value than the other, and undoubtedly their value is as in the above order. It may be asked why this should be so, and why the supposition that to look for type in the head is not strictly accurate. I admit that the head of any unit is its most distinctive feature, but its species type might easily be detected were the head covered up, viz. :—

Supposing you were going along a long straight road, such as a chaussée in France, and in the distance you saw something. At first it would be indescribable, but in a short time you would perceive it to be a man (species); gradually, as the distance grew shorter between you and the man, he would appear a European (variety), an Englishman (strain), then you would say, "I am certain it is one of the Smiths, they all walk alike" (family), and finally you would say, "How are you, Smith?" (individual).

Such an example as this is shows that these five types have each a definite value. If I were an auctioneer I might be tempted to say, "Now, gentlemen, what price shall we say for these five types?" Virtually you may say what you like as long as the value was proportionate. Thus :—

Presuming that "correct type"—by this I mean whole types (5)—is a unit, then it may be written as $\frac{5}{5} = (1)$.

In the same way a pack of 62 cards is a unit $\frac{62}{62} = (1)$. Therefore if we take the unit correct type, and give to it the number of cards in the pack, we can apportion the value of it accordingly:

Species	32
Variety	16
Strain	8
Family	4
Individual	2
Correct type	62

If this then is the value of correct type, something a little below it will be very good; but into this question I will not now enter, it will be sufficient for us at present to deduct the following conclusions :—

1. That there are five types.
2. Naturally there is no "correct type."
3. Man defines a "correct type," but it is incorrect, as he only defines two types out of the five.
4. That the various types have to be looked for in different portions of a unit.
5. That correct type according to man has a certain definite value.

CHAPTER IV.

ARTIFICIAL SELECTION—THE ORIGINAL UNITS OF DOMESTICATION AND THEIR RISE, AFTER THE APPEARANCE OF RATIONAL MAN, INTO FAMILIES, STRAINS, VARIETIES.

THE development of man brought about an enormous change in certain species of life-forms. How is this to be accounted for? As follows, viz. :—

Ever since man became a rational being, not of course in the state he is in at present, but from the dawn in him of reason up to the present day, he has waged a ceaseless and increasing warfare against those species inimical to his person; in consequence of which many of those varieties and sub-divisions formerly numerous are dying out or are already extinct; even whole species have passed away where he dwells; whilst, on the other hand, with fostering care and increasing knowledge he has vastly multiplied and improved those species and their sub-divisions necessary to his being.

The species man has chosen to domesticate are indeed few compared with those he finds no use for. Consequently those that he attempts to destroy or leave to themselves, being almost neutral either for good or for bad, continue to exist under the same circumstances as they did prior to his development. For this reason we see but little change in their life-forms, a fact evidenced by the rude drawings we find in the caves inhabited by primitive man of species existing synchronously with him, and but little changed in their outward form and habits at the present day.

In this we have abundant proof that the change going on in nature is so slow and so gradual that cycles of years must pass, the "morning and evening" of the 1st chapter of Genesis, before variation can possibly, under natural means, turn into positive evolution, a cycle of time not having passed since primitive man as a rational being was developed.

Had man not been developed, is it possible for a moment to believe that in the species he has selected to cultivate there could have existed the enormous number of varieties at present to be found?

Certainly not. Natural selection debars such a probability. Altered circumstances, such as comparative isolation, change of climate, food, &c., would certainly have produced differentiation of form, because of the necessity life-forms would find of adapting themselves to these particular circumstances; but it would be improbable, ay, even impossible, for such a number of varieties of the same species as at present exist, living together and reproducing their kind, at the same time and in the same locality and under similar circumstances as ours do now around us, under a natural system of selection.

How then can we account for it?

All this change, not of species, but of varieties, all this profusion of breeds, all this complication on original prototypes, arises entirely and solely from the development of man himself.

The gradual rise of man's intellect has caused him to put aside a system of natural selection for one of artificial selection, and the greater the mass of varieties of a species we find the greater will be the intellectual power in breeding of the variety of the species of man, who cultivates them; consequently, since in England breeding is better understood, and every species of domestic unit has a larger number of varieties than is to be found in other countries, the outcome is that we can only suppose that the English nation is in a higher state of intellectual progression as far as breeding is concerned than any other nationality. Hence the reason the French nation cannot produce such specimens of their own indigenous breeds as we can.

In natural selection we find the following facts, namely, that a unit will breed with another unit as long as it belongs to the same species, and that they need not belong to the same variety, strain, or family; again, that man has no control over the alliances of units in a wild state.

In artificial selection this is all reversed. Man chooses which units shall mate, and in doing so arrogates to himself the question of their alliances, and consequently in a large measure forces a desired life-form in the progeny.

Now, it must not be supposed for a moment that man suddenly appeared upon earth—as typified by Adam—as an immediate rational being, and capable of making use of his reason. I have previously remarked that I shall not enter into the question of a divine creation or not; consequently, when I say that we must not believe in man appearing as Adam, it must not be inferred that I mean that Adam did not exist. Adam most certainly did exist, but not as a single individual of that name.

Adam (the word) means the first man, consequently to me Adam means the first life-form or race of beings of a new life-form, differing to what had previously existed. An Eastern form of expressing that creation had attained its highest grade of earthly progression—a reasoning life-form, a life-form having dominion over the life-forms in a lower state of organisation, a necessary adjunct to any forms of life. Science precludes, without

detracting an iota from the value of the Holy Script, the idea of man suddenly appearing, such as the inference is that one would draw from an absolutely literal translation of Genesis.

Man was the outcome of evolution on a brute beast.

To us primitive man living in the stone age and dwelling in caves, as we know him to have done, surrounded by the bones and remains of the wild beasts he preyed upon, could not have been far removed from the level of a beast—as such some small races of mankind still remain.

If, then, this was the condition of life of primitive man, which it undoubtedly was, what must have been the condition of our primitive man's primitive predecessor, that is allowing the same ratio of time and advance to have taken place between him and his predecessor as between him and us? Undoubtedly the difference between man and the beast would be removed—man and the beast would appear on the same level. Therefore primitive man in the first stage was a brute beast, and could only have been so.

It would be absurd to state that he was a monkey such as exists at the present moment, but undoubtedly primitive man and the monkeys and we too are descended from a common prototype, whose existence certainly was, but whose life-form has not yet come to light. Primitive man could not, therefore, have at once commenced a system of artificial selection, for the simple reason that instead of keeping units in a state of domestication he preyed like a wild beast, living from hand to mouth, in the same way as they do, and searched for food when obliged by hunger.

In all probability, therefore, the first of our domestic species that was domesticated by primitive man was the dog, and taken in hand by primitive man as an adjunct or aid in obtaining food, but even to arrive at such a height of reasoning power as this shows man must have progressed far in advance of his predecessors. Again, as he advanced he became a pastoral being—keeping examples of the same species as we do to-day.

Man must then have roamed, as some species of men do to-day, over wide expanses of country, and in these journeys he could not help having observed that the cattle, &c., he kept differed greatly in outward form from those kept by other men. He could not have accounted for the dissimilarity existing, but he must have perceived the difference.

Gradually in process of time he must have noted that, if he desired the same stamp of animal, he must always breed from his own, and not cross with those of other flocks, and lastly he came to perceive that if he saw a unit in the herd of a distinctive shape, markings, &c., he must find another as like it as possible, isolate the pair, and in-breed for the furtherance of the particular life-form. Thus then has the artificial system of breeding arisen, and with it an increase of variation in species under domestication. Domestication no longer entails upon its units the necessity

of adapting themselves to their surroundings to the same extent as in nature pure, nor is there any longer the same necessity for change. Under domestication it is no longer the survival of the fittest. They are governed by a higher power than their own instinct. Man says which shall be the sire and which shall be the dam, and compels them to reproduce the stamp of creature he desires, but he has no power over them in two ways. He cannot altogether insist upon them quenching the unconquerable desire, the inherent longing born in them, to return to a condition of natural selection; nor can he compel them to lay aside the hereditary gift, handed down to them through myriads of generations, a gift which he too participates in—the heirloom of every unit in the world—given to us by the great prototype of all, Original life, viz., the right of variation.

In a few words, then, both the wild species and the domestic species of all kinds came from a common stock. These species might have existed as single varieties or as several, and from them man took units of the one variety or of several natural varieties, and from that one variety or several our domestic varieties, strains and families are now evolved. But when we come to try and explain what the life-forms of the horse, the cattle, the sheep, the dog, &c., were when man first took them up, we do not know. In all probablity they must have been much the same as they now are.

No man can say what was the life-form of the first dog of domestication, since the dog tribe exists in one form or another all over the world. Therefore, by the time man arrived at the state of intelligence which allowed him to domesticate the dog, he too was possibly all over the world, consequently the dog domesticated might have been of a variety of life-forms. The same thing we may say of cattle, sheep, fowls and ducks, but in the case of the pigeon it is different. Darwin clearly proves the origin of the domestic pigeons to be that of the common blue rock; but of all others, that is to say, the origin or the parent stock, it is lost in obscurity. All we know is that each domestic species has its wild life-form, and that from the wild species man brought into domestication our tame ones, and that whether the first he domesticated was of one variety or half a dozen, he has greatly increased the varieties, made them into families and strains, and is still doing so.

Now, since we have understood how artificial selection arose, we might profitably see the result it brings about. When man desires an increase in size he breeds only from the biggest, if for speed from the speediest, if for colour from those of the colour he desires.

There is no reason why we should not have a race of horses about the size of a poodle, a race of cattle marked like a draught-board, &c.

Such examples may appear excessively absurd; I give them nevertheless, well knowing that, if by natural selection or varia-

tion one of them was produced, man by artificial selection could, if he so desired, reproduce them in numbers.

The doctrine of selection applies not less perfectly to the animal kingdom than it does to the vegetable. Indeed, in the latter it is probably seen at its best. Year by year new varieties of nearly every plant are produced. Nature certainly produces them, but would not reproduce them, or indeed few. Man, however, by artificial means does so.

I have explained that if we want size, speed, colour, &c., in our life-forms we always mate the biggest, the speediest, and those of the same colour. The result of this is that we not only get a big animal, a speedy animal or a well-coloured animal, but we get an advance in the attribute; we get a bigger, and a speedier, and a better coloured life-form than we began with. As exemplification of the above we have:—

1. The cart horse.
2. The race horse.
3. The Queen's cream-coloured horses.

Bred for size, bred for speed, bred for colour. The first is a bigger animal than he used to be, the second a speedier, and the last now breeds this colour.

But of colour I can produce one equally as good, namely in the basset-hound.

Of this breed we have two strains in this country—the Couteulx and the Lane.

Now the Couteulx is, as a rule, a very perfectly marked tricolour, with the tan and black markings deeply accentuated. The Lane hounds, on the other hand, are very weak in markings if they happen to be tricolour, but as a fact they are far more generally to be found lemon and white.

Some years ago my attention was drawn to the fact that the Couteulx hounds were, as a strain, becoming degenerate from too great inbreeding, and to stop the manifest deterioration in size, besides other points which we hold to be necessary in the basset variety, I recommended a cross with the Lane hounds.

Without going into the various objections brought forward against the cross, the one that most clearly interests us here was that of colour. I was met with the reply that the cross would ruin the colouring of the Couteulx hounds.

Nevertheless, I urged the cross, arguing that while in the first cross there would necessarily be a large number of lemon-and-white hounds, as we inbred to the desired colour the lemon-and-white puppies would disappear, in ratio to the amount of the Couteulx blood we infused into the life-forms, and finally disappear altogether.

I have myself bred in the last two years every cross which might be tried with advantage, and I give the results, though be it said, I might largely supplement the table, with the results of several friends' experiments too, but, as they are almost identical with my own, I do not see the necessity of giving them, viz.:—

C=Couteulx strain.
L=Lane strain.

Crosses.	No. in Litter.	Tricolour.	Lemon and White.
1st. $C+L=\frac{LC}{2}$ (Half bred)	10	5	5
2nd. $C+\frac{LC}{2}=\frac{C_3L}{4}$ ($\frac{3}{4}$ bred)	8	5	3
	7	5	2
	5	3	2
Intermediate Cross.			
$\frac{CL}{2}+\frac{C_3L}{4}=\frac{C_5L_3}{8}$ ($\frac{5}{8}$ bred)	9	6	3
3rd. $C+\frac{C_3L}{4}=\frac{C_7L}{8}$ ($\frac{7}{8}$ bred)	8	7	1
	2	2	0
	6	6	0

Now the object was the introduction of fresh blood into the Couteulx hounds, and the opposition that colour would be destroyed thereby. The results, however, have destroyed the opposition theory.

In the first cross the colours were evenly balanced. In the second there was a preponderance in favour of the Couteulx colouring. In the third, in three litters, there was only one lemon-and-white puppy, whilst in the intermediate cross, one virtually unnecessary for the experiment, we observe the preponderance in favour of the Couteulx hounds. In fact, it would be difficult to find a theory prove more exact than this one has done, when put to the test of actual experiment.

Only in one instance have I known it actually to fail, and this was in some $\frac{C_7L}{8}$ hounds, but then both parents were lemon-and-white; but, taking the whole set of experiments into consideration, the results will prove still more remarkable when I add that in nearly every litter of even pure Couteulx there is generally a lemon-and-white puppy.

We come now to a point as regards breeders in which selection is of the highest value. I have stated that nowadays every variety has a club, and that the club has formulated a code of points.

Artificial selection then becomes a most important aid and an undoubted one in enabling us to reach that agreed-upon standard, viz.:—

Compared with this standard every unit possesses points, which are either − or +, that is to say, the unit may fail because it does not attain the perfection laid down in this standard, or it may fail because it overreaches the standard. Now supposing A to be minus a certain number of points and we breed him with B, who is minus the same points as A is minus in and plus the same points as A, the result will be the formation of life-forms which will be still more − and still more + the standard than either A

or B were. In other words, the bad points of both parents are intensified.

This may appear somewhat strange, and the breeder may be unable to account for the production of life-forms further away from the standard than ever, but he will at once perceive the cause, when he understands that he has mated the units which will bring about such a result. He will perceive that in breeding for the attribute speed, &c., a speedier life-form than the original parents was developed. In like manner, in breeding these two units together, A and B, he has mated units which will produce their attributes still more distinctly, and, as these attributes are defects according to the standard of points, the offspring will be still more deficient.

If, for instance, we say that the point A is deficient in is loin, and that the point B is wanting in is also loin, the produce of the two, say C, will be still slacker in loin than either the parents A and B.

Undoubtedly the breeder expects to get from the two a unit or units with better loin, but from want of knowledge he has selected two units which will bring about exactly the reverse to what he really desires. Now the unit the breeder should have mated A to should have been the exact reverse to B. That is to say B should have been – the points A was + in, and + those he was – in.

In this way – would equalise +, and + on the other hand –.

The result certainly might not reach the standard, since it would depend entirely on the worth or value of the stock employed, but at the same time the result of the alliance would be far more likely to reach the standard points than any other method of breeding, and at the same time have every chance of being considerably better than either of the parents.

I need scarcely bring to my readers' minds the very superior units bred from very indifferent-looking dams and even sires; the fact is that the selection has been properly applied, whether it was intentional on the part of the breeder or not.

The term is frequently applied that such and such a pair "nick" well. Now it must not be supposed that together they have a special power to produce good stock, they have not, they are simply "selectively compatible."

Thus if we have a Spanish cock who is faulty because he is – length of lobe, he must be mated with a hen who is faulty because she is + or too great a length of lobe.

Such then is the value of artificial selection in the breeder's hands, and we cannot too highly esteem it; but at the same time it must be used only as one of the tools in producing good stock.

In conclusion, then, we may carry away from this Chapter—

1. That artificial selection has complicated varieties, strains, and families.

2. That in breeding it must be employed.

CHAPTER V.

THE TYPES FORMED BY THE EQUAL-FACTOR SYSTEM.

DIRECTLY a man commences to breed any kind of stock he causes two units to divide, and division is carried on in every case under a system of factors.

Now the first system which presents itself to our notice is the "equal-factor" system. Before, however, bringing the system under the notice of my readers, it would be well for them to remember that every life-form, if correct, has five whole types, and by it I mean such a life-form as Fino VI., where every type is pure. Secondly, it is of equal importance that it be borne in mind that heredity is one of the powers of a unit. The question, therefore, which arises from the above is—

Will a given or existing life-form be perpetuated by the equal-factor system or not?

In species, variety, strains, and families it will, if the units employed be of the same species, variety, strain, and family, but it will not if the species, variety, strain, and family (and of course individuals) be differing. In the case, however, of similar families we cannot possibly have an equal-factor system, since they are related, and the breeding of them together must produce units borne on an unequal system of factors.

If we take the arithmetical unit 1 as an example, we are aware that it is formed by the amalgamation of two halves, viz. :—

$$\tfrac{1}{2}+\tfrac{1}{2}=\tfrac{2}{2}=1$$

or by four quarters, viz.—

$$\tfrac{1}{4}+\tfrac{1}{4}+\tfrac{1}{4}+\tfrac{1}{4}=\tfrac{4}{4}=1$$

Arithmetically, then, we have the formation of the unit 1; we see absolutely no distinction between one of the halves and the other, one of the fourths or quarters and the other three; all that we do remark is that the unit 1 has been formed on an equal system of factors, and I give the example now to show exactly what a unit is composed of, if formed on this system; but supposing instead of making use of arithmetical factors we represent them by alphabetical ones, we at once observe an enormous change—

$$\text{viz., } \frac{A}{2}+\frac{A}{2}=A \qquad \frac{B}{2}+\frac{B}{2}=B$$

Here then a given type would be perpetuated; but if we, on the contrary, brought together A and B on the same system, the new

unit would be neither A nor B; it would be a new formation—a composition, an alloy—a mongrel of the two types, viz.:—

$$\left.\begin{matrix} A \\ B \end{matrix}\right\} = \frac{AB}{2} = 1$$

$\frac{AB}{2}$ is, then, no longer pure A or pure B. Now, if we represent A as the sire and B as the dam, many people would say that $\frac{AB}{2}$ should resemble A; on the other hand, for exactly similar reasons, $\frac{AB}{2}$ should resemble B. When I say this, it must not be inferred that $\frac{AB}{2}$ does not at times resemble A or B. The reasons that the offspring take more after the sire's type or more after the dam's is a question which will be treated in another chapter; but given A and B, and they be bred themselves on an equal-factor system, then the produce $\frac{AB}{2}$ will, as I say, be a mongrel.

$\frac{AB}{2}$ does not resemble one of its factors more than the other; it resembles them both in proportion to their value in its composition, and as each is $\frac{1}{2}$, the hereditary power of A and B will be the same; therefore $\frac{AB}{2}$, the produce, will be an alloy of them both equally. As an experiment of this, let any man take a glass of water and a glass of wine, then mix them. The produce is no longer wine, nor is it water; it is an alloy of both, a composition of the two equal halves, wine and water.

Again, if we take the gas of the metal hydrogen and bring it into contact with the gas chlorine, volume for volume, the result is the formation of a new unit, viz.:—

$$\left.\begin{matrix} \text{H (Hydrogen)} \\ \text{Cl (Chlorine)} \end{matrix}\right\} \text{HCl (Hydrochloric Acid).}$$

If, then, we apply such a system to the types of a life-form, the result is exactly similar, viz.:

Species. *Similar Types.*

$$\left.\begin{matrix} \text{Dog} \\ \text{Dog} \end{matrix}\right\} = \frac{\text{Dog} + \text{Dog}}{2} = \text{Dog.}$$

Variety.

$$\left.\begin{matrix} \text{Basset Hound} \\ \text{Basset Hound} \end{matrix}\right\} = \frac{\text{Basset Hound} + \text{Basset Hound}}{2} = \text{Basset Hound.}$$

Strain.

$$\left.\begin{matrix} \text{Conteulx} \\ \text{Conteulx} \end{matrix}\right\} = \frac{\text{Conteulx} + \text{Conteulx}}{2} = \text{Conteulx.}$$

Family.

$$\left.\begin{matrix} \text{Fino de Paris} \\ \text{Fino de Paris} \end{matrix}\right\} = \text{Fino de Paris.}$$

Individual.

Fino VI.

Here we are obliged to stop, because there is no other unit Fino VI.; the other individual must differ. But when we apply this system to species, varieties, strains, and families, which differ exactly as individuals do, the equal-factor system brings about a double type, a blend, or a composite, viz. :—

Species. *Differing Types.*

$$\left.\begin{matrix}\text{Dog}\\ \text{Cat}\end{matrix}\right\} = \text{No life-form of any type.}$$

Varieties.

In this case I will again give, as a first example, the horse and the donkey, viz. :—

$$\left.\begin{matrix}\text{The Donkey}\\ \text{The Mare}\end{matrix}\right\} = \frac{\text{Horse} + \text{Donkey}}{2} = 1 = \text{a Mule.}$$

It will be observed that the horse and the donkey are types of two varieties, both descended from a previously existing prototype, the Eohippus. Naturally they would hardly breed together. At the same time, as mules are produced, it is evident that they will. In consequence of this we class them as varieties, but they have, through evolution, drifted so far apart that we might almost class them as quasi-species.

In the preceding example of species, it will have been observed that no offspring can be produced. In such an example as this we have the curious phenomenon of production by the parents, but incapability of reproduction by the offspring. In fact, as far as I am aware, only one instance of reproduction by a mule is on record, namely, a jenny in the Jardin d'Acclimatation, Paris. The question, however, more clearly of interest to us in the mule is its variety type, since the life-form must have been produced on the equal-factor system.

The mule, then, is a new composite variety, half a donkey and half a horse, clearly an alloy or a mixture of two types to form one.

It is impossible to look at a mule of any kind, be it $\frac{\text{Horse}\quad\text{Donkey}}{2}$, $\frac{\text{Goldfinch}\quad\text{Canary}}{2}$, or any such mule, $\frac{\text{Pheasant Fowl}}{2}$ or $\frac{\text{Turkey Fowl}}{2}$, such as have occurred in the Jardin d'Acclimatation, without being struck with the resemblance to both parents. The fact is too patent to be passed by without being animadverted upon.

I could give numberless cases of the experiments which the Jardin d'Acclimatation goes in for, many not necessarily mules, but crosses of varieties. Still the resemblance to both parents is always to be seen. One cannot wonder at this when one looks at the factors; they are equal, consequently the hereditary power of both units as varieties is equal, and the variety type produced being neither that of the sire nor that of the dam, we can only come to the conclusion that they are composite varieties—alloys or mongrels.

The case, however, of the mule, be it horse-donkey or any other non-producer, I should not have given, were it not for the fact that such examples mark the border-line between varieties and true species in the parents.

Speaking, however, in general terms, varieties of a species which have been formed by man through selection have no difficulty in breeding and producing offspring, which will in their turn reproduce, viz. :—

Basset hound and Spaniel.

Now, when we cross these two, the result is the formation not of a mule but a mongrel or hybrid, viz. :—

$$\left.\begin{matrix}\text{Basset Hound}\\ \text{Spaniel .....}\end{matrix}\right\} = \frac{\text{Basset Hound} + \text{Spaniel.}}{2}$$

We see in this creature, not only the likeness to the sire, but also to the type of the dam—equally so; the factor of both basset hound and spaniel being equal in the unit, the hereditary power is likewise equal, consequently the produce is a composite variety.

Strains.

$$\left.\begin{matrix}\text{Couteulx}\\ \text{Lane ..}\end{matrix}\right\} = \frac{\text{Couteulx} + \text{Lane.}}{2}$$

I have already referred to the objections which were raised against the crossing of the Couteulx hounds with the Lanes, and I have said that the opposition as regards colour has been proved to have no *raison d'être*. Had my adversaries imagined that I intended to produce a variety such as the composite one above, they would have been perfectly right in crying down my theory, since not only would the question involved be one of colour, but the produce as a strain would be a mongrel. Notwithstanding this very apparent fact, as I have already explained, such mongrel types are allowed to compete, and what is more, often win. Mr. Krehl, one of our largest and most experienced breeders of bassets, has often assured me that the most perfect bitch (as far as points go) that he ever had was bred this way, a very strong instance in point of the remark I made in the last chapter that type and points are not synonymous terms. The question, however, which we have to deal with here is not whether such units should be allowed to compete or not (personally I think they should, since no club accepts strain type as a type), but whether the strain type of either Couteulx or Lane is reproduced on the equal-factor system. It is not, and I would guarantee, and I am sure many other breeders would too, to pick out a composite Couteulx + Lane hound out of fifty pure-bred specimens of either Lane or Couteulx strain. A $\frac{\text{Couteulx} + \text{Lane}}{2}$ hound is an alloy, and nothing more.

The very fact is apparent, so frequently is it seen in the results obtained by breeders, say for instance of pigeons—a man buys the cup bird at the Palace show of one strain, and the hen the cup bird at Birmingham of another; he mates them. How many winners does he produce? Does he produce one? No, the

offspring is generally worthless, and the breeder is disgusted. Were he to look at the real reason he would see it was because he was breeding on an equal-factor system, in which heredity was equal and the produce an alloy; good as it possibly might be as a combination of two strains, it has not a chance in severe competition where only one is wanted.

Families.

Fino VI. (Fino de Paris family) } $\int = \frac{\text{Fino de Paris} + \text{Jupiter}}{2} =$
Scandal (Jupiter family) .....

Finoling

In this case we have the union of two members of the same strain, the same variety, and the same species; consequently, the difference of type is that of family; nevertheless, the offspring (Finoling) is a commixture of the two, a mongrel family type. The hound in question resembles his sire's family greatly, but if you look at him carefully you observe that he also resembles his mother. Such family crosses are absolutely necessary, as I shall show later on, but at the same time the produce is neither that of the sire's family type nor that of the dam's, but a blend of the two.

Individuals.

Fino V. } $\int = \frac{\text{Fino V.} + \text{Igerne}}{2} = \text{Fiddler.}$
Igerne

In this case we have two hounds, both of the same family type, the same strain, variety, and species type, yet they differ in individual type. As a result of this we have Fiddler with an individual type of his own, a composite of two individual types, a type which even his own brothers and sisters differ in, so distinct is individuality. At the same time he has family, strain, variety, and species type in common with his parents,—all but individuality.

We, therefore, come to the conclusion that individual type is a commixture of two individual types, and practically impossible even in brothers and sisters to be reproduced twice, though it may be so very nearly.

In the above examples, then, no type has been reproduced in purity, except where the species, variety, strain, and family are the same.

In every other case, even in individual type, the equal-factor system brings about a blend of two types. Thus, instead of reproducing a distinctive or desired type, we have the destruction of two pure types to make way for a hybrid one, an alloy or a mongrel.

Now when we come to look at nature, it becomes evident that this is exactly what does go on. Man has no power over the wild creatures; consequently, although varieties of the same species rarely mate, strains do, families do, and individuals of the same family; consequently as the wild units breed in this fashion there can be no correct type (5) in nature; species type is correct enough, so is variety, but as to strain and family and individual, it is in

a constant state of change and composition; ergo, man with his "correct" yet incorrect type is not very much in advance of nature.

Breeding then on the equal-factor system, whether it be with the same species, &c., or with differing varieties, &c., is very nearly tantamount to breeding according to natural selection, and natural selection cannot produce "correct type" any more than can the equal-factor system. I take it for granted that the object of a breeder is to get as near an individual type as he can; consequently, since he cannot reproduce individual type on an equal-factor system he must try another, and even with that he will fail, since the nearest he can get to it is a family type founded on an individual type, but this I must leave to the following chapter.

For the moment let us look the equal-factor system in the face, and observe what really would occur if we left nature to herself. Varieties in nature I have said rarely breed together. Why? Because they have taken a long time to develop into varieties and have little or no inclination to breed together. As instances of this we have the grouse and ptarmigan residing together, but rarely interningling; the rabbit and hare, the red and the fallow deer, the rook and the jackdaw.

It is, indeed, seldom we see the hybrid, and when we do it is looked upon as a mongrel, the results of a mésalliance, which should not have occurred. On the other hand, our domestic varieties are of so recent a creation that they freely breed together without any such compunction as is witnessed by the few alliances of the wild varieties.

To give an idea of what would occur, as far as our domestic varieties are concerned, were the life-form man to be swept off the face of the earth to-morrow, would it be difficult to portray the result of what would inevitably ensue?

Just suppose, for an instance, that some vegetable bacterium, such as is the cause of malarias, fever, cholera, &c.—some bacillus, only with ten times the virulence of either that of enteric fever or rabies—were to be evolved, man would be unprepared for it, and the greater part of mankind, especially those in a high state of civilisation, being closely segregated, would fall victims to the attack of this excessively low form of life. Were this to occur, is it to be supposed for an instant that our domestic stock would continue to reproduce the varieties we have by artificial selection formed? Certainly not. All the differing varieties, strains, families, and individuals of them would breed together on an equal-factor system. Many of them would perish that have become through man's agency dependent on him, many who cannot exist without him.

In course of time all man's varieties, strains, and families would revert to a condition of natural type—to an almost similar state of existence that they were in before man, by evolution, became a reasoning life-form. Look, if you desire instances of this, if you turn out half-a-dozen kinds of pigeons into a dovecot,

how soon they will return to the blue-rock. Look, as I have seen in Australia and New Zealand, how soon the cattle will return to an original type. Look how Captain Cook's pigs have returned to the wild tusker. Look in America, how the horses and cattle have returned to a primitive type. Just as a garden or land, if left uncared-for or untilled, glides out of cultivation and runs wild, so would man's artificial types gradually revert to their primitive prototypes and run wild too. Isolated breeds, such as the Channel Island cattle and Shetland ponies, would continue to exist for many years; but, though it might be called an equal-factor system, individually it would become an unequal system, and with that an end would come too. They could not form with other life-forms of the same species type, mongrel varieties, because of their isolation, but they would perish because of it. In the end, however, entire creation would once more resume its own natural progression towards a goal of which we know naught, and the time would soon come about when all traces would be lost of the influence that was once felt of the civilising power of its highest life-form—man.

In conclusion, then—

1. Similar varieties, strains, and families bred on the equal-factor system do not variate in type.
2. Differing varieties, strains, families, and individuals always variate in type.
3. Man's object is to check variation in type of existing varieties, strains, and families.

CHAPTER VI.

THE TYPES FORMED BY THE UNEQUAL-FACTOR SYSTEM.

In the preceding chapter I gave the formation of the arithmetical unit 1, by halves and quarters, as an illustration of the equal-factor system. By making use of the same we can equally illustrate the system we have now to deal with, namely, the unequal-factor system, viz.:—

1 may be composed thus—

$$\begin{aligned}
\tfrac{1}{16}+\tfrac{1}{16}&=\tfrac{2}{16}=1\\
\tfrac{7}{8}+\tfrac{1}{8}&=\tfrac{8}{8}=1\\
\tfrac{3}{4}+\tfrac{1}{4}&=\tfrac{4}{4}=1\\
\tfrac{5}{8}+\tfrac{3}{8}&=\tfrac{8}{8}=1\\
\tfrac{1}{2}+\tfrac{1}{4}+\tfrac{1}{4}&=\tfrac{4}{4}=1
\end{aligned}$$

A unit, then, may be composed of two or more factors, one of which is the greater. Beyond this we observe nothing.

But if we, on the other hand, make use of alphabetical factors, in the same way as we have previously done, we then observe that the greater represents the greater part of a previous whole that was called into use to form the new unit.

We have already observed that heredity was one of the attributes of a unit; consequently, if this is the case, the greater the factor is the greater will be the resemblance of the new unit to the unit of which the greater factor is a portion. In other words, if we increase one factor in a unit over that of the other factor or factors which together go to form a whole, the greater will be the type of the unit towards the type of the unit of which the greater factor a part, viz.:—

$$\left.\begin{matrix}\mathrm{A}\\ \mathrm{B}\end{matrix}\right\}\frac{\mathrm{AB}}{2}\qquad \left.\begin{matrix}\mathrm{A}\\ \mathrm{C}\end{matrix}\right\}\frac{\mathrm{AC}}{2}\qquad \left.\begin{matrix}\\ \end{matrix}\right\}\frac{\mathrm{A_2BC}}{4}$$

If we carefully follow what has happened here we will not only understand the unequal-factor system, but the results which follow its employment.

A, B, C are three types. In the first place we have the production of $\frac{\mathrm{AB}}{2}$ and $\frac{\mathrm{AC}}{2}$. Now $\frac{\mathrm{AB}}{2}$ and $\frac{\mathrm{AC}}{2}$ are bred upon the equal-factor system; they are composite types, having in them an equal proportion of respectively A and B types and A and C types. As a

consequence, they have no right to resemble respectively A more than B, A more than C. But when we come to look at the produce of $\frac{AB}{2}$ and $\frac{AC}{2}$, namely, $\frac{A_2BC}{4}$, there is a difference.

In the first place, the unit is not bred upon an equal-factor system, but an unequal. Secondly, although the unit is a composite type, there is no longer an equal proportion of the factors. There is twice as much A as B, twice as much A as C, and when we look into the matter still further A is equal to both B and C put together.

Consequently the unit has a right to resemble A more than either of its parents. It therefore follows that the type produced is that of A. It is not strong, certainly; it amounts to little more than a preponderance in favour of A; this is only to be expected; but, if this be understood, it will be then seen that, if the factor A be still further increased, the higher the factor is made the greater will be the resemblance of the unit to the type represented by A.

Now, it will be remembered that I said in the last chapter that under the equal-factor system similar types would produce similar types, but I also remarked that in process of time the equal-factor system even in them would have to give way to an unequal-factor system.

This could only take place if absolute isolation were ensured.

I hardly think that it is necessary in giving an example of the results that would come about in the type of species, varieties, strains, and families, to give them all as I did in the former chapter, since it will be better understood when I come to deal with those of differing varieties, strains, families, and individuals, but I will give a single one in order to show what would occur.

In reality the variety type might differ, the strain and family types might differ, and of course the individual must; but I will assume for a moment that they are all similar except that of individual, and the illustration I shall give will be not only that of how nature keeps up her types, but one in which domestic life-forms also would too if isolated, that is supposing always that the units employed were similar in all types but that of individual, viz. :—

Formation of a herd of wild cattle.

Let us imagine that a young bull A has been driven off from a herd by the leader, and that he has managed to entice away three cows of his own family; we have then A, B, C, D, who are capable of reproducing a new herd.

A necessarily becomes the sire, consequently all units born will be $\frac{AB}{2}$, $\frac{AC}{2}$, $\frac{AD}{2}$, units of composite individual type.

During the period in which A lives or remains master of the situation no other bull is the sire, consequently the units born must, after the first generation, be produced on the unequal-factor system, viz. :—

A_3B, A_3C, A_3D, and as every fresh generation was born the A factor would rise, the greater factor in the new units being A.

In course of time, however, A must die, or more likely his throne is usurped by one of his sons, who in eastern fashion either kills him or drives him from it, and all other claimants to the throne, who in turn move off to form new herds themselves.

But if we stick to the original herd, and presume, so as not to make a greater complication of figures necessary, that a bull, $\frac{AB}{2}$, becomes master, then he breeds with units whose factors may be $\frac{AB}{2} - \frac{A_3B}{4} - \frac{A_7B}{8} - \frac{A_{15}B}{16}$, and the same with C and D.

The result is that there is an enormous increase of individuals of A type, since a larger number of units will have a greater factor of A than $\frac{AB}{2}$, the sire, has himself, and so matters go on until $\frac{AB}{2}$ is driven from the post of honour. The increase of A as a type may be well imagined then if a new bull $\frac{A_7C}{8}$ becomes sire.

Now looking at such an example as this is, we see in the first place that the species type remains the same, the variety and the strain, but the family type is not that of original A, it is replaced by his individual type, which has become a family type, which in time will variate too.

In addition to all this the illustration affords us a clue to the prolonged period nature takes for evolution to come about, since it shows us that family type is formed on individual type, strain on family, and so up the ladder till we arrive at species.

In due time we shall see how long it takes to form these differing types in artificial types, but it will be sufficient now to see that the unequal-factor system checks variation in nature by limiting it to family type, or at most strains, since wild varieties decline to reproduce together offspring. If then nature takes years to bring about a perfect variation in family type, so much so that it almost amounts to strain type, how long will it take nature to produce a real strain, a perfect variety, and at length an absolute species?

It must have taken some cycles and cycles of years to bring about the variation of such varieties as the red deer and the fallow; how long then did it take to produce such a quasi-species as the donkey and the horse, such true species as man and the dog?

As for the bird tribe and man, it is almost impossible to conjecture. I scarcely like to give man and the original germ of life, it is past comprehension.

In nature then the unequal-factor system simply keeps up variety, strain, and family types, and lessens individual variation.

On the other hand, in the hands of man it may be made to keep up variety and strain and family, and to form a desired new family type. This we will better understand further on. Supposing, however, that instead of the same variety, the same strain, and the

same family we turned out on to an island a number of variety types, viz.:—Black Spanish, Cochin, Brahma, and Dorking fowls, thus isolating them so that no fresh variety could come nigh them. No doubt some of them would breed together at first on an equal-factor system. Thus for a short time we should have an equal-factor system in both similar varieties and dissimilar, but before very long the time would come when one bird would become the master, the result being that all the units would gradually lose the distinctive variety type of the first prototypes we placed on the island; for a time following this there would be mongrel composite type of the four varieties, and following upon this would arise a new variety type, which if man chose he could cultivate into a new one. The four original artificial types would then have reverted to an original natural one, which would again variate if fresh artificial varieties were added, or become a still more natural one if the gamefowl were added instead.

At any rate, after the introduction on to the island of the first four varieties named an equal-factor system would first take place, and then speedily an unequal would follow.

Now, I have already mentioned the cattle of the Channel Islands and the ponies of Shetland; how is it supposed their especial types (as varieties) were produced? In dealing with this I do not of course refer to their attribute of diminutiveness, since this will appear in the next chapter. What I refer to is their particular life-form by which we at once know them from others of a similar species.

Surely it cannot be supposed that they, like the Biblical Adam, were formed in a day and have continued their particular variety type ever since?

I cannot even believe that they were the remains of a previously existing variety which has elsewhere become extinct, and which must have been, were this supposition correct, a variety existing before the islands were separated from the mainland.

No; just as in the case of the fowls, a new variety or a natural type of variety has arisen through isolation—a new variety which man took a fancy to and cultivated. We can understand this perfectly when we consider the circumstances which surround the type, viz.:—

Both groups of islands are at a considerable distance from the mainland, and had at one time undoubtedly no cattle and no ponies. Probably in the case of Jersey or Aldernay one or two units were imported from Normandy, the people being of Norman extraction, and Normandy being considerably nearer to the islands than England.

The consequence of this would be that, if the first two units were unrelated, they would commence breeding on an equal-factor system; if related, on an unequal. In any case, in one or two generations, whether the original import was two or a dozen units, the unequal-factor system would replace the equal. The consequence of this is that, if they were originally allied, a new family type became produced which in time has become a strain and

finally a new variety type. If, on the contrary, the original units were of differing variety type, the unequal-factor system has produced a natural variety type through isolation. Now, it is quite immaterial whether this variety arose either one of these ways or another on the unequal-factor system. What we have to take into account is that it was produced by an unequal-factor system, and, having been taken up by man, has been perfected by artificial selection.

And what I say of the Channel cattle is equally applicable to the Shetland or Iceland ponies.

Now, under a system of artificial selection we can make use of this unequal-factor system to bring back a composite type to one of the types from which it was formed, not, of course, in species, since species types do not form composites, but in varieties, strains, families, and in addition to this it forms new family type from an individual, viz.:—

Varieties.

$$\left.\begin{matrix}\dfrac{\text{Basset} + \text{Spaniel}}{2} \\ \text{Basset}\end{matrix}\right\} = \frac{\text{Basset}_3\text{Spaniel.}}{4}$$

It will be observed that the composite has no distinctive type as a variety, but directly you bring it into connection with one of the types of which it is composed, which in this case is the basset, a new variety unit is produced, still a composite, but with a preponderance in favour of the basset. This is, of course, accounted for, since the equal-factor system has given way to an unequal one; a greater factor has been produced, and that being the basset, type follows the type factor.

How much more would this be if we continued to make use of bassets as sires? The unit produced would in a short time return to basset type, since the factor representing the spaniel prototype would be reduced, attenuated, and, in consequence, lose its hereditary power entirely.

In conclusion, then, the units would return to the original type of one of the prototypes.

Strains.

$$\left.\begin{matrix}\text{Conteulx} + \text{Lane} \\ \text{Conteulx}\end{matrix}\right\} = \frac{\text{Conteulx}_3\text{Lane.}}{4}$$

Parallel to that of varieties.

Families.

$$\left.\begin{matrix}\dfrac{\text{Fino de Paris} + \text{Jupiter}}{2} \\ \text{Fino de Paris}\end{matrix}\right\} = \frac{\text{Fino de Paris}_3\text{Jupiter.}}{4}$$

Parallel with varieties.

Individuals.

$$\left.\begin{matrix}\text{Mignarde}\\ \text{Fino de Paris}\end{matrix}\right\}\left(\frac{\text{Fino de Paris}+\text{Trouvette}}{2}\right)=\text{Finette}$$

$$\left(\frac{\text{Fino de Paris}_3\text{Trouvette}}{4}\right)$$

Parallel with varieties.

But, in addition, we obtain a family type formed on the invividual, Fino de Paris.

Now, in every one of these cases we see an enormous advance towards the types of the type factor. In varieties we can bring a composite back to an original prototype, so we can in strains and families; but we cannot bring it exactly back to individual type, as none are exactly the same; consequently, since an individual becomes the parent of a family, his individual type is produced by this method as a family type, and a new individual type is formed. It must not be supposed, however, that factors of a similar value, such as I show above, are the proper ones to reproduce a type of either a variety, strain, or family, or, indeed, a new family. We have seen that the value of type in varieties, strains, families, and individuals is different; consequently, the value of the factor necessary for their reproduction will be different. This question, however, I will leave for another chapter. It is at present sufficient to note that the unequal-factor system will cause a type of one of the prototypes to return. Thus it will appear obvious to the reader that, if this takes place in composites of differing varieties, strains, families, and individuals, it must necessarily do something more in those that are not different.

In a word, it increases their hereditary power.

Summing up, then, the use of the unequal-factor system—

Naturally, it increases the hereditary power of units.

Artificially, it stops variation.

By this time it must have occurred to my readers that the unequal-factor system is tantamount to the ordinary word "inbreeding," and on this question, just as we have found it in "correct type," an enormous amount of prejudice and ignorance prevails.

There is a vast number of breeders who, directly the word "inbreeding" is mentioned, put their foot (metaphorically speaking) down and declare that it is wrong, unnatural, and absolute ruin to the stock on which it is practised. So it is, I am bound to say, if it is carried too far. So is everything in this world, if it is abused. We have already seen that in nature this must and does exist; we have seen that in spite of it life-forms continue of the same species, variety, strain, and family type for ages without coming to grief. It cannot be, then, wrong, unnatural, and ruinous. There are a class of people who go on the principle that there is no such thing as a medium in the use of anything that savours of danger. They say, "Don't touch the

fire and you won't burn yourself." The men who condemn inbreeding in this way are synonymous with those who say you must not smoke, or drink, or play at cards, since you will inevitably spoil your health, become a drunkard, or ruin yourself.

Such ideas as these are wrong, unnatural, and ruinous. Inbreeding is like smoking, drinking, and playing at cards to a man who knows what he is about, who knows how far he may go without damage to his stock, health, or pocket. It is an aid to the breeder, as are the others to the comfort and enjoyment of life, and those who decry the system may sit down and ruminate the fact that not a single species, variety, strain, family, or individual could have been produced in this world without its employment at the beginning of sexual life in ages past. Again no individual type can become a family one, no family a strain, &c., without it.

If another instance were required, it is before us in the shape of the enormous sums given for pedigree stock of all kinds. Is it to be supposed that they are produced on an equal-factor system? No, on a very carefully worked unequal one.

Yet those that condemn the system are the first to buy good stock of this kind or make use of pedigree sires; they know that these sires have a higher hereditary power than ordinary stock. How do they suppose that they are thus gifted? Naturally? No, because they have been inbred to a certain type, they have a big factor of that type, and when bred from, impose that type upon their offspring, so that even if the offspring have been bred upon an equal-factor system, they will have a preponderance in favour of their sire or dam, as the case may be. It stands to reason that a unit such as $\frac{A_3B}{4}$ must have a greater hereditary power than $\frac{ABCD}{4}$ in the production of type.

Supposing, for instance, that a farmer has a mare bred upon an equal-factor system, viz., $\frac{DEFG}{4}$, and that his desire is to breed to the type of a well-known horse M (carefully inbred). In such a case as this the two units would have species and variety type in common, very probably strain type also, but not family or individual.

The offspring would be $\frac{M_4DEFG}{8}$, and would consequently have a large factor of M, which would give not only M type as the family type, but the individual type of the unit would resemble M more than it would $\frac{DEFG}{4}$.

But were M not procurable and the farmer had two stallions to select from, viz., $\frac{M_3B}{4}$, $\frac{M_2BC}{4}$, doubtless the first would have a

greater hereditary power in prodneing M type than the other, viz. :—

$$\left.\begin{array}{c}\frac{M_3B}{4}\\ \frac{DEFG}{4}\end{array}\right\} = \frac{M_5BDEFG.}{8}$$

$$\left.\begin{array}{c}\frac{M_2CB}{4}\\ \frac{DEFG}{4}\end{array}\right\} = \frac{M_2CBDEFG.}{8}$$

To all intents and purposes all three would be bred upon an equal-factor system, bnt the produce would be really units in which the faetors were unequal, and as a result we would have a preponderance also towards M type, both family and individual, though neeessarily it would be less than were the farmer to breed from M direet.

Clearly then we have before us the true valne of a earefully-bred pedigree animal. Vast sums, I have said, are day by day given for them, and whether it is wrong, unnatural, and ruinous, aecording to the idea of some, these priees will be given as long as men breed to improve stock towards a desired type, simply for the reason that they have a higher hereditary power of transmitting their type than units bred on an eqnal system of factors.

We may then eonclude that the unequal-factor system, whilst inereasing the hereditary power of units of similar types, promotes it in those of differing types towards a desired type and eheeks variation.

CHAPTER VII.

RESULTS OF CARRYING THE UNEQUAL-FACTOR SYSTEM TOO FAR—IN VARIETIES, STRAINS, FAMILIES, AND INDIVIDUALS.

Now, whether the unequal-factor system be applied to the wild varieties, &c., or whether it be applied to domestic ones, there comes a time when a limit has to be put to it, otherwise if isolation be complete it brings itself to an end.

If allowed to be continuously practised it most certainly means ruin, but in the domestic varieties, &c., sooner than in the wild, individnals sooner than in families, families than strains, and strains sooner than in varieties. I have said that inbreeding is condemned, and I have given the reasons that this supposition is put forward. I have also shown that for the reproduction of type it is absolutely necessary.

I purpose now to show what follows on a continuous practice of it, and to show that it is wrong, unnatural, and ruinous if it be abused.

Unfortunately, those that protest against the system look at the ultimate results rather than the immediate, and that they see these results only in families and individuals, not in varieties and strains.

Now, supposing A and B were to be absolutely isolated so that no other unit could possibly be added to them, they would commence to reproduce on an equal-factor system, and as a result we should have units thus composed, viz. :—

$$\frac{AB}{2}$$

Following on this would come the unequal-factor system, or inbreeding and the production of units, viz. :—

$$\frac{A_3B}{4} - \frac{A_7B}{8} - \frac{A_{15}B}{16}, \text{ &c., &c.}$$

On arriving at this stage it must be obvious that we have returned to a condition of things in which we might certainly represent $A^{\frac{15}{16}}B$ as $A^{\frac{15}{16}}$ (A), since B as $\frac{B}{16}$ is absolutely worthless compared with $A^{\frac{15}{16}}$.

We have, then, returned to A, and B, as a type, has vanished.

Again, supposing such units as $\frac{AB}{2}$ and $\frac{A_3B}{4}$, $\frac{A_7B}{8}$ commence to

reproduce, then we would have a large number of fresh units in which there would be a greater factor of A.

Now, such a system as this for the production of types is perfection, but if we attempt to apply it to either wild or domestic stock for any length of time, it does mean ruin. In both cases, if isolation is perfect, whether naturally or artificially, the results are the same, and the reasons are not difficult to see.

At first both wild and domestic units will stand a certain amount of inbreeding, but after that the properties of their blood, as in the case of A and B, become exhausted, and, like a field from which crop after crop has been raised, without lying fallow for a time or being manured, the produce becomes weak, impoverished, and valueless; and just as we abuse the soil on which we raise the crop, we abuse the constitutions of the units on whom we entail the unequal-factor system. Neither can stand the constant wear and tear, and exhibit their repugnance in a very marked manner.

At first we see a deterioration in constitution, then in size and other attributes; in fact, I might say they become weedy; then comes a difficulty in rearing offspring, and finally incapability of reproduction when degeneracy becomes complete.

We should find that a species would soon degenerate into a variety, a variety to a strain, a family, and then a single individual, when the species would become extinct—a systematic descent of a species to a single individual, instead of what it should be—namely, the ascent of a single individual to a species.

But the descent is almost electrical in its swiftness compared with the ascent. It is so in all things. Only start a stone at the top of a hill. At first it begins to go slowly, but as it rolls it gathers speed, and finally reaches the bottom with a headlong rush. So it is in species, varieties, strains, families and individuals. Once isolate them and set the unequal-factor system in motion, you are bound to bring the whole edifice to the ground with a crash; it gathers forces as it goes, and in the end destroys them. It must not be supposed that this takes place in a day or a year, since in the case of the wild varieties they will endure for ages. On the other hand, domestic ones speedily show its evils; but, given either wild or domestic ones, perfect isolation brings about deterioration, degeneration, and extinction sooner or later. It is this fact which causes the unequal-factor system to be so strongly denounced, and rightly so, if it be abused.

It is the abuse of alcohol and tobacco which makes their use condemned, and abstinence, entire abstinence, crammed down our throats.

Let us now look at nature and examine what takes place under perfect isolation.

Supposing we placed on an island, or in an enclosure, a herd of deer, the units of which were all unrelated, at first they would breed on the equal-factor system, then would come the unequal.

At first they would keep up to the average size and strength, but gradually they would get smaller and less in number, and then finally become extinct; but deer not being domesticated, it

would take a very long time for them to come to such a climax as this. Why? Because only the strongest becomes the sire, and for ever, while the herd exists, the strongest male is the sire.

On the part of the females, only the strong become the dams; whilst on the part of the offspring only the strong are reared—all sick and wounded being left to die. Thus, we have always a strong stock left, though, by degrees, the stock itself, owing to the unequal-factor system, becomes weakened; so that after a lapse of time the strong stock of to-day will not compare with that of bygone times. Such a herd might exist for a hundred years or more, but it must in course of time decay and become extinct. It is for these reasons that we cannot point out a single small island in which there is an indigenous species or variety of the mammalia. They cannot exist under complete isolation.

At this very moment we hear of the tendency to degeneracy shown in the Scotch red deer, and the means taken to improve them. But should we wish for a typical instance of how a variety has degenerated into a few individuals, we have it in the so-called wild cattle of Great Britain, viz. :—

In the early days of Great Britain—that is to say, prior to the Roman invasion—the country was little more than a vast forest, in which the wild cattle as well as the inhabitants found a dwelling. I do not suppose that anything was done, even after the Roman epoch, to enclose herds of this variety until the Norman invasion; but when this latter epoch was arrived at, certain districts were turned into large forests and kept thus as hunting grounds, in one of which it is well known one of the Norman monarchs met his death. As civilisation increased and land came into cultivation, the wild cattle, as a variety, became isolated in various parts of the country, and of these forests or chases that remain we have several, amongst them being Chillingham, Cadzow, and Lyme.

I doubt very much whether the three named could produce five dozen individuals; in fact, if the information which reaches me is correct, and it is given on good authority, the condition of the latter named was a herd (?) of two miserable, attenuated specimens of a bygone race. This is the condition of a variety that once covered the face of the land, and in it we see the results of isolation—a variety reduced not only to one or two families, but actually to a couple of degenerated individuals, whilst in other chases they have become extinct. The unequal-factor system or inbreeding has been allowed to be pushed to abuse. The idea that, by keeping up this isolation, purity of the variety would be ensured, has been a suicidal policy, really it has destroyed them. Yet they have existed thus for many hundreds of years, notwithstanding breeding of a very gross character which must have gone on.

But it is only because they have lived in a state of nature, under a state of natural selection, under a system of the strong always being the sires and dams of the progeny, that they have lived or existed so long. Had they been in a state of civilisation, they would have passed away and become extinct long since.

When, however, under such circumstances, we turn to units in a state of domesticity we find that they cannot exist any period in comparison to the wild creatures.

The sire is not always the strongest, he is selected because he is the most typical, according to man's idea. The dams are not invariably the strongest; man breeds from all, even the very weakest, and trusts to attention and care to bring up the progeny. It is not always the strongest of the progeny that live to become the sires and dams of future generations. Hundreds that under a natural state of life would die and perish, man carefully nurtures and rears so that he can breed from them too.

Under such circumstances, it is not the survival of the fittest, but the survival of many also that are unfit, and which nature, had she her way, would reject as useless.

What must be the result of this?

Undoubtedly that domestic life-forms are more prone to degeneracy, and as a fact do degenerate speedily, compared with those in a state of nature.

As examples of this I give the following, viz. :—

Varieties.—In a previous chapter I stated that I would account for the diminutive size of the cattle of the Channel Islands and the ponies of Shetland, &c. Why is it?

Undoubtedly because the unequal-factor system has been run too far, undoubtedly because deterioration has set in from it. In the case of the ponies, climate, bad food, &c., has of course been a factor; but the primary cause in both has been the results of inbreeding caused by isolation.

It is impossible to glance round any exhibition of fowls, pigeons or dogs without being struck by the fact that we have large and small representatives of many similar varieties.

In the case of fowls we have bantams.

In pigeons, pigmies.

In dogs, Italian greyhounds, toy terriers, &c., all dwarfs. How are they produced?

Undoubtedly, in one sense, by artificial selection, by breeding always from the smallest. But such a system would necessitate a much longer period to produce them than it at present takes; scarcely a new variety appears in poultry and pigeons before in a very short time a corresponding dwarf appears too, either bantam or pigmy. By artificial selection, this would necessitate a score of years, instead of two or three as it now takes.

If we were to say that a gross abuse of the unequal-factor system was the cause, added to a system of artificial selection, then we would arrive at a true statement of the existence of these dwarfs, and this is proved beyond doubt, since the difficulties which arise in their production are immense. The system has been abused, and man is perfectly aware of it.

Strains.—In a previous chapter I said that the Couteulx strain of bassets had degenerated in size. Our first importations were large animals, of fine bone, colour, and physique, but in 1886, after a somewhat prolonged absence from England and from illness, I

was unable to perceive what had occurred in the breed, until I was asked in that year to judge the big show of that variety at the Royal Aquarium.

Now nearly every hound exhibited there was of the Contenlx strain, and bred from the original importations or their offspring. I was considerably struck at the time with the hold the variety had already taken on the public, on account of the number brought together; but I was also greatly struck with the deterioration in size, colour, &c.

I therefore set to work to find the reason, the result being that in the following year I was able to bring out my small book on the basset and its breeding. To do this I was obliged to look up the pedigree of nearly every hound in the breed, and from the statistics which I had furnished to me by the breeders of the variety I made out the sum total of over 1,000 hounds born in the country since their importation. This, however, must be considerably less than the actual sum, since I only asked the best known amateurs to give me statistics of their breeding.

Nevertheless, the result was that, in addition to the statistics, I was furnished with such evidence that it could not be otherwise than that the reason for the diminution of size, inability to rear offspring, and incapability of production after a stud visit was the outcome of inbreeding of a very gross character.

Many of these hounds had never had a new factor brought into their composition since their arrival in this country, whilst others, on the contrary, were bred apparently from differing blood relations, but which on examination I found to be actually blood sisters and brothers, with factors identical in blood and value.

Again, considering that although I made out the original importations to be of no relationship at all, for the sake of my theory, coming as they did from the same kennel, there is very little doubt that they were related before they arrived here. This point, however, I was unable to make out, as the pedigrees further than the English ones I could not obtain.

The results, however, of my investigations were to me ample and sufficient to give inbreeding as the cause of the too apparent deterioration. Nor was I wrong. It was to me manifest that the unequal-factor system had been grossly but inadvertently abused. If then this took place in a strain, it can be well imagined what would happen in the same time in a family, where all the units employed must be more closely related.

Families.—One of the earliest importations into this country of the basset variety was a hound of the name of Fino, better known perhaps as "Onslow Fino," since he was imported by Lord Onslow.

In due time a family was established on his individual type, one branch of which was in the possession of a gentleman who shall be nameless, since he brought me to task for saying that deterioration was evident in his stock, although I gave my own experiments, having the other branch of the family in my own possession. In both cases the results were the same—loss of size,

colour, and almost type, though type is the last thing except incapability of production that an abuse of the unequal-factor system brings about.

After a certain period, deterioration manifested itself. Notwithstanding this, from inexperience, and not altogether my own fault, I began mating hounds of the following factors together— $\frac{A_5 M_3}{8}$, whilst on the other hand the gentleman unnamed mated, or if he did not, a friend of his did, $\frac{A_3 V}{4}$ with $\frac{AV}{2}$, this $\frac{AV}{2}$ being produced by mating $\frac{AV}{2}$ with $\frac{AV}{2}$.

Such a system of breeding was absolute lunacy, yet I did not see it for some few years afterwards.

I have previously remarked that tricolor was one of the desired points in the Couteulx strain In the unnamed breeder's kennel, before he learned experience, the results of continuously breeding together members of the same family brought into existence hounds not only deficient in size, &c., but 20 lemon-and-white ones out of a total of 48. In my own it was worse still.

I am not aware that the mental powers of the lower-class higher life-forms are impaired to any great degree, except that they become nervous, shy, and of a highly sensitive order, so much so that in pointers the percentage of gun-shy dogs is considerably higher than those bred on an equal system of factors; but at the same time I think I can produce one instance of lunacy (I am sorry to say of my own breeding), a basset-hound in the possession of Dr. Clifford Allnutt, of Leeds. He describes it as a canine "idiot."

On the other hand, congenital malformation in bassets bred on this system are appalling, and it is seen invariably in the tail, not only in the shape of an unmistakable "kink," but absolutely in the abbreviation of the organ.

Turning now from such examples in life-forms of a considerably advanced organisation to the highest, man, we note the marriage of cousins to be the origin of many grievous ills—idiocy, blindness, and malformations frequently appearing in the children of such unions; and yet, with all this staring us in the face, the English law, as it at present stands, debars a man marrying his deceased wife's sister, unions which in nearly every case would result in the production of children who would be born on an equal system of factors. And why? Because it is said that it would interfere with the social status of a sister-in-law in a married man's house.

From a breeding point of view, the marriage with a deceased wife's sister would result in no evil to the offspring, whilst the union of cousins certainly does, and personally I consider that it would be far better to legalise the Deceased Wife's Sister's Bill and make the union of cousins illegal, though in many cases the children are not visited by the evils as described.

Again, if we go a step further, we find the marriage of an uncle and a niece allowed in some Catholic countries, by special Papal Dispensation. As an instance in point, let me offer the Spanish

throne, as an example of what it has resulted in a few generations back.

Individuals.—When we come to consider that families before long degenerate, it may well be imagined that in individuals it will come more speedily still, under an unequal-factor system, viz. :—

When Comte Le Couteulx mated his well-known hound Fino de Paris to Trouvette, a union which resulted in the Fino de Paris family type at present in this country, he produced a bitch named Mignarde. This he again mated with her own sire, viz. :—

$$\left.\begin{matrix}\text{Fino de Paris}\\ \text{Trouvette}\end{matrix}\right\}\text{Mignarde}\left.\begin{matrix}\\ \text{Fino de Paris}\end{matrix}\right\}=\frac{\text{Finette(Fino de Paris}_3+\text{Trouvette).}}{4}$$

In all probability Trouvette was already related to Fino de Paris, but arguing that she was not there is not the slightest doubt that Finette exhibited deterioration, since, instead of mating her with one of his own hounds, Mons. Le Couteulx had her served by the stud hound of another breeder.

Supposing instead that he had again mated her with Fino de Paris, the result would have been more degenerate still, a dwarf and constitutionally a wreck.

Dr. Walsh (Stonehenge), my late friend, gives us an admirable instance of this in his work, namely, the continuous use of one sire, which very soon brought about degeneracy and finally incapability of production in the offspring.

It must be now obvious that if the unequal-factor system arrests variation and produces types, it also causes deterioration, degeneration, and extinction. In fact, it may be looked upon, as are alcoholic drinks and tobacco, as a source of good or of evil.

Virtually, it has a right side and a wrong side ; put to proper use, it is of the utmost value, but if abused it is fatal.

Turning back for a moment, it will be observed that I mentioned, in dealing with strains, that I found in the case of the Couteulx that breeders were actually mating blood sisters and brothers. To understand this correctly, a knowledge of pedigree is necessary, a question I have not arrived at yet, but without that the following example will put before my readers what I mean, viz. :—

Supposing a breeder to have two females got by the same sire out of the same dam, and their factors to be $\frac{AB}{2}$, and that they be mated with their own sire A, then the offspring will be $\frac{A_3B}{4}$.

Supposing again that the breeder give one $\frac{A_3B}{4}$ female away and keeps another himself, and that in course of time they are sent to two brothers, viz., $\frac{A_3D}{4}$, what would be the relationship

between the produce? Most men would say that the produce $\frac{A_6BD}{8}$ were cousins, because they were out of two sisters and got by two brothers, and that, therefore, there would be no harm in breeding them together. On the other hand, it must be obvious that they are more than cousins.

$\frac{AB}{2}$ and $\frac{AB}{2}$ were simply sisters.

$\frac{A_3B}{4}$ and $\frac{A_3B}{4}$ were more than sisters.

A_3D and A_3D were more than brothers.

Consequently, $\frac{A_6BD}{8}$ and $\frac{A_6BD}{8}$ are cousins, sisters, and more than sisters, and breeding them together would be wrong, unnatural, and ruinous.

In conclusion now on this subject, it must be amply apparent that no variety, no strain, no family and no individuals, if isolated, can continue to produce their types or themselves for any length of time on the unequal-factor system if in a state of isolation. They are bound to degenerate and become extinct. The unequal-factor system must not be abused, and to those who are inclined to push it too far I say, as "Punch" does to those about to marry, "Don't." Neither can we do without it; therefore we must, if possible, find a medium course, in the same way as we can find a man moderate in his pleasures.

At present it will be sufficient to conclude that isolation or abuse of the unequal-factor system brings about deterioration, degeneracy and extinction in varieties, strains, families and individuals.

CHAPTER VIII.

INTRODUCTION OF FRESH BLOOD INTO DETERIORATING VARIETIES STRAINS, FAMILIES AND INDIVIDUALS.

In a former chapter I stated that the life-forms of the wild creatures had little altered since the time of primitive man; consequently, when we come to imagine the lapse of time which lies between primitive man and man of to-day it will be granted that there has been opportunity afforded for not only varieties, strains, families and individual types to die out through isolation, but whole species. Indeed, many species since primitive man's time have passed away. How then is it that the same types exist at present as did then? Simply because isolation is imperfect.

Inequality of factors still exists, otherwise we should have no pure type, and units of similar factors of equal and unequal value still breed together, yet there is but little appreciable deterioration. Why is this?

Because isolation is just complete enough to keep up pure type, but incomplete enough to allow fresh factors to be added. An addition, which on the one hand does not interfere with existing type, and on the other, brings fresh vigour to the deteriorating old ones.

Now, we have seen that if differing variety, strain, family and individual types be brought together, the result is the production of units in which, instead of one pure type, a composite one takes its place.

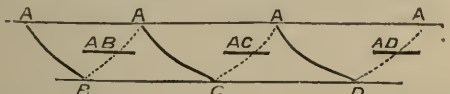
At the same time we must not forget that if one type be the result of greater inbreeding than the other, the hereditary power of the units of that type is greater; consequently, although the produce of two differing types is a composite, a preponderance in favour of the type which is the result of great inequality of factors will be found in the composite, viz. :—

Presuming A to be the variety, strain, and family type of a herd of wild cattle, which, from an abuse of the unequal-factor system, have commenced to deteriorate; then if isolation be perfect, an example of which I have given in the last chapter, they will in due course become extinct; but if, on the other hand, isolation be imperfect, they will be joined by B. The result of this will be the formation of composite units, viz., $\frac{AB}{2}$, in whom A will be the preponderating type.

In due course of time the unequal-factor system will again commence, and the formation of units $\frac{A_3B}{4}$, $\frac{A_7B}{4}$, $\frac{A_{15}B}{16}$, at which time the herd will have absorbed B. Revigorated, it will not only be brought back to what it was before deterioration commenced, but it will also return to the type of prototype A.

Again, in due time it would commence to deteriorate, but C then joins, when the same process by which B was absorbed takes place again.

The outcome of this is that a constant variation is taking place; or it may be described as a wave, in which there is a systematic rise and fall from vigour to commencing deterioration, and then to vigour again, or it may be illustrated as follows:—A, $\frac{AB}{2}$, $\frac{A_3B}{4}$, $\frac{A_7B}{8}$, $\frac{A_{15}B}{16}=\frac{A_{16}}{16}=A$, but A at the end of the wave, or when it has reached its full height, is not exactly what A was before the wave commenced at the previous A, as may be seen thus, viz.:—



Such an illustration as I give here in alphabetical terms shows us exactly how nature not only prevents deterioration of life-forms by giving them fresh blood, but it also shows how type is maintained.

And, in addition to this, it shows us how variation takes place too—this imperceptible change that, from our minute period of existence, we are unable to fully appreciate. If we look back through the lapse of time which has taken place between us and primitive man, and can imagine a series of ripples in an unbroken line between him and us, we can imagine how and why we variate from what he must have been; and why, if we were isolated, we should by this time have perished from off the face of the earth.

At the same time it must be obvious that the more perfect the isolation is, the smaller the life-forms become, although they keep up their types.

What applies here to man applies equally so to every form of life; but to continue our subject more clearly to our interest, namely, that of fresh blood, we have seen that the wild creatures require it much less often than the domestic ones, from the fact that in nature the strong is always the sire and dam of the offspring, whilst in domesticity it is the most typical. Now, if man bred his stock in the same way as nature does, and introduced fresh blood by the same means, we should have a succession of waves or variations between "correct type;" we should have a year or two of typical unity, and then a succession of years of

declining type, then medium type, and then a rise to good type, culminating in "correct type" again. Such a system would find no favour, and would put an end to the objects of specialist clubs. In fact, we would have to acknowledge that inbreeding was useless, since as soon as we perfected "type" we had to undo it again to rebuild it up.

One thing, however, we must acknowledge, viz., that fresh blood is necessary; but we need not destroy existing types, as nature does, for the time being, when she introduces it.

Varieties, if they are large, seldom require to have fresh blood brought in, on account of the mass of unrelated units; strains do, because of the few; families constantly, because there are no unrelated units in them; individuals at once, as, in bringing fresh blood to them, we are trying to keep up a family type as well. But in whatever way new blood is introduced it must be so done as not to interfere, or as little as possible, with existing types.

Now, supposing A to be an existing type, which, through abuse of the unequal-factor system, is in a fair way to deterioration, then B must be introduced; but we have already seen that B, although it will stay deterioration and bring the units of A back to a state of vigour, will entirely, *pro tem.*, destroy A as a pure type, by substituting $\frac{AB}{2}$ instead, a type which will only have a slight preponderance in favour of A, and it will require a certain time to arrive again at A.

Supposing now that we removed all the male units of A type and substituted B ones in their place; we should not only destroy A type, but we should change it to B, since B, as the sires, would continue to produce $\frac{BA}{2}$, $\frac{B_3A}{4}$, $\frac{B_7A}{8}$, &c., until the type would become pure B. For these reasons fresh blood cannot be too carefully brought in.

Now nature's manner of introducing fresh blood is a correct method, but it is too slow for man, and on the other hand domestic units require it sooner than wild ones, consequently we have to anticipate nature, whose system we have seen to be

$$A, \frac{AB}{2}, \frac{A_3B}{4}, \frac{A_7B}{8}, \frac{A_{15}B}{16}, A.$$

Man, on the contrary, sees that $\frac{AB}{2}$ will bring matters to perfection sooner than B, $\frac{A_3B}{4}$ quicker than $\frac{AB}{2}$, &c. Therefore he introduces his fresh blood, not as whole B, but as a factor, and by doing so keeps his stock always up to the top of the wave which represents "correct type;" but on the other hand, by anticipating nature in this way, fresh blood has to be more frequently brought in.

Thus, in introducing fresh blood it must be done by mating units together, one of which must have a greater factor of the desired type and a lesser of the blood to be introduced, viz.:—

$$\left.\begin{matrix} A \\ A_3B \end{matrix}\right\} \frac{A_7B}{8}$$

And in this alphabetical example we probably see the explanation of the old adage, "It takes four generations to make a gentleman."

Now, if we had a number of such units, viz.:—

$$A_7 \begin{cases} B \\ C \\ D \\ E \\ F \end{cases}$$

it is clear we could go on breeding them together for a lengthened period without deterioration stepping in, or recourse having to be made to fresh blood, whilst A as a type would remain practically unaltered.

Now, if we apply such a system to varieties, strains, families, and individuals of our domestic kinds, we can see how it will work.

Varieties.—In this case I shall again give the basset hound, though it must not be supposed for a moment that I should advise such a procedure as this will appear. France is still in existence and the basset to be obtained there, though not in the same state of perfection as it has now been brought to in England. At the same time, supposing that we could not obtain another pure bred basset in the world, and that the breed was deteriorating from want of fresh blood, it most certainly could be kept up in full vigour, and perfect as far as type goes, by producing first a composite thus :—

$$\frac{\text{Basset} + \text{Beagle}}{2}$$

then increasing the basset factor until the beagle type was destroyed, when the produce could be run through the deteriorated pure bassets.

There would be no alteration in type, no appreciable difference in the life-form of the animal, whilst the variety would be brought back to full vigour and strength.

This is exactly what I did do in 1875, when there was no basset hound bitch in England, and bassets thus bred were exhibited by me in 1877 at the Agricultural Hall.

But if, on the contrary, we employed beagle sires on all the basset bitches, a composite generation of units would be formed, which it would take years to bring to a state of basset purity as a variety type the same as existed prior to the cross.

As an example of this in point, the ancient Irish wolf hound has become almost extinct, but by careful selection and introduction of fresh blood through units, which contain a large factor of that blood and a small one of "great Dane," the almost lost variety as a type is in a fair way to become as well-known as it was in years gone by, not only as a type of a variety, but in all

its pristine size and vigour, which years of abuse of the unequal-factor system and neglect have brought down to a few degenerated specimens.

It is the same with the blood hound; it has been found absolutely necessary to go to the New Forest hound to find fresh blood, yet by introducing it as a factor the type of the blood hound has not altered one bit. And it would be the same with the so-called wild cattle, which in a few years will absolutely become extinct, unless this craze for purity of blood is put aside. They could be brought back to their former numbers to-morrow, not perhaps exactly as man does, but by doing it as nature does, and destroying the male composite units for the first two or three generations. At first there would be necessarily a composite in the female units, but in a very short time type would return to that of the original variety, besides being brought back to a state of vigour. At the same time selection would have to be made use of, as to what blood most nearly resembled that of the wild cattle, and without doubt this would be found in the variety known as that of "Perugia," whose type very closely resembles that of the wild cattle as a variety.

Strains.—When dealing with the strain type formed by differing strains, under the equal-factor system, I showed that the result must be a composite, and I then referred to the objections raised against the proposal I made to restore to their original state of vigour the Conteulx Basset, which through a too great abuse of the unequal-factor system had become deteriorated.

The strain I selected was the Lane.

Now my intention was not to replace the Conteulx sires by those of Lane, but to produce units with a greater Conteulx factor and a lesser Lane, so that these might be used through the strain and so bring it back to vigour.

It has now been undoubtedly proved to be correct, so much so that even those who at one time decried the system find it necessary, if they want to go on breeding, to make use of it.

Type suffers in nowise, the greater Conteulx factor annihilating the Lane as a type, whilst the lesser Lane is sufficient to bring back the Conteulx to their former average size.

Numbers of $\frac{\text{Conteulx}_3\text{Lane}}{4}$ hounds as a strain type are now to be seen on our benches, and although they exhibit a certain Lane type, yet the preponderance is far on the Conteulx side; consequently it is evident that the Conteulx factor requires to be still further strengthened, but of this I shall treat in the following chapter.

Families.—Now, since all families are made up of units, all the units of a family must necessarily be related; consequently fresh blood is more frequently required than in strains, and to introdnce fresh blood into a deteriorating family we must do it by means of a factor, just as in the previous cases, so as not to interfere with the existing type of that family. Just as in the case of varieties we had to make use of a very similar variety of the

same species; just as in the case of strains we had to make use of a strain of the same variety, so in the case of families we must make use of another family of the same strain.

In supposing now, which is more than a supposition, that Comte Le Couteulx found the Fino de Paris family he had begun to be commencing deterioration, viz. :—

Finette (Fino de Paris family)—

he had to breed out to another family, namely, the Termino.

This at once gave him a blend or composite, viz. :—

$$\text{Theo}\left(\frac{\text{Termino}+\text{Fino de Paris}}{2}\right)$$

with a bias in favour of the Termino family, which was probably quite, if not more carefully bred than the Fino de Paris; but directly the Fino de Paris factor is increased we at once find a return to the Fino de Paris family type, as viz. :—

Fino V. (Fino de Paris $_3$ Termino),

and at the same time there is no deterioration in the units.

Individuals.—Here we arrive at a question which must necessarily require a knowledge of pedigree; since we must, if we are going to introduce fresh blood, know the individual factors of the units themselves, not their factors of family type, strain type, or variety type.

Both units necessarily have a large similar factor to produce family type, a large factor of their individual prototype which has become a family type, but, notwithstanding that we have not yet arrived at a knowledge of pedigrees, the examples I give will, I think, be readily understood.

At the same time it must be remembered that we are not breeding for a new family type, nor do we wish to bring fresh blood into an old family type, but into the produce of two individuals of the same family type. Now, units of the same family may have :—

1. Identical factors as well in blood as in value, viz.: $\frac{A_3B}{4}, \frac{A_3B}{4}$.

2. Or they may be identical in blood, but different in value, viz.: $\frac{A_3B}{4}, \frac{A_7B}{8}$.

3. Or they may have one similar and the other differing, but both of the same value, viz.: $\frac{A_3B}{4}, \frac{A_3C}{4}$.

4. Or they may be similar and the other differing, and at the same time differing in value, viz.: $\frac{A_3B}{4}, \frac{A_7C}{8}$.

5. Again, they may be similar, dissimilar, but with an opposite value, viz.: $\frac{A_3B}{4}, \frac{B_3A}{4}$.

Now, in Case 1 it is obvious that the units are identical in every way, consequently they cannot be bred together; and I may say the same of No. 2.

Nos. 3 and 4 are the proper units to breed together, as by this means we not only keep up A type, but introduce a fresh factor into the progeny, viz.: (No. 3) $\frac{A_6BC}{8}$, (No. 4) $\frac{A_{13}B_2C}{16}$,

viz.: $\frac{\text{Fino de Paris}_{15}\text{Jupiter}_3\text{Juno}_6\text{Pallas}_3}{32}$ = one unit.

$\frac{\text{Fino de Paris}_{21}\text{Termino}_4\text{Ravande}_4\text{Trouvette}_3}{32}$ = one unit.

These together form the new unit—

$$\frac{\text{Fino de Paris}_{36}\text{Termino}_4\text{Jupiter}_3\text{Ravande}_4\text{Trouvette}_3\text{Juno}_6\text{Pallas}_3}{64}$$

Now, the parents of the new unit have two factors in common, but two differing; consequently we produce in the new unit, not only a large type factor for the established family type, but we bring in two differing ones as not individually in common.

Pedigree, therefore, must be known to allow us to introduce fresh blood into units that have a tendency to deterioration; consequently, it will be obvious that breeding for family type, in addition to bringing in fresh blood, but not that of another family, is one of the most advanced kinds of breeding we can go in for, because it must be remembered that we are not only introducing fresh blood, but that we are keeping up family, strain, and variety types into the bargain.

Case No. 5, however, I must warn my reader to beware of, since, instead of keeping up the family type of the individual, you at once destroy it, viz. :—

$$\left.\begin{matrix}\frac{A_3B}{4} \\ \frac{B_3A}{4}\end{matrix}\right\} = \frac{A_4B_4}{8} = \frac{AB}{2} \text{ (a composite)}$$

or a return to the type of the first two individuals that gave rise to the family type.

In conclusion, then, we may deduct from this chapter the following facts :—

1. That fresh blood, if it be required in varieties, strains, families, and individuals, must be brought in as a factor.
2. That in this way many types will be maintained and vigour added.

CHAPTER IX.

STRENGTH REQUIRED IN THE GREATER FACTOR TO PRODUCE GOOD TYPE IN VARIETIES, STRAINS, FAMILIES, AND INDIVIDUALS, AND A BREEDER'S AXIOM AS TO HOW THEY MAY BE PRODUCED.

In the last chapter we saw that fresh blood or a new factor could be added to a unit without interference with any of its existing types, even into almost the most fleeting of them all, family type. Hitherto, we have taken our ideas from nature on the one hand, and added man's intelligence on the other, so as to bring about a quicker result, and by acting thus, we find that, if we cannot produce a variety, a strain, a family, or an individual type, absolutely and exactly as it previously existed before the introduction of fresh blood, we can nevertheless reproduce it so nearly that practically there is to all intents and purposes no material change or variation from the prototype.

Now in Chapter III. I called the reader's attention to the fact that the five types which existed in a unit or life-form had a definite value individually, and that the value of each type must be differing, because of the material difference that existed between them.

I then gave the value of the whole five, were they each to be accepted as correct, as 62, thus apportioning them:—

Species	32
Variety	16
Strain	8
Family	4
Individual	2
Total	62

This then would represent "correct type" were it absolutely defined, but we have seen that only species and variety are defined, and that any strain, any family, and any individual type may be correct.

This, however, does not in any way alter the value of type, since species and variety, although defined, still have the same value 32 and 16, and strain, family, and individual types, although not defined, still remain at 8, 4, and 2; consequently, correct or undefined, the whole value of the types a unit is composed of remains at 62.

But when we introduce fresh blood into a unit, although we may or may not materially change the type or its value, we split the value of the type up into factors, viz. :—

Supposing we take as an instance strain type. My basset "Joyeuse"—

Strain ... Couteulx Lane ... 4 + 4 = 8.

Here we have a composite strain, and, the value of the type being 8, it has been divided into the factors 4 + 4 or halves, each type of which the whole composite type is composed being given the value to which it is entitled, and, since in this case it is half, each type is apportioned the half of the value of a whole type, which is in itself 8.

But supposing we take the case of another hound, viz., "Chastelard"—

Strain ... Couteulx $_7$ Lane ... 7 + 1 = 8

There is no change in Couteulx type as a strain, although Lane blood has been added. Strain type still remains at 8, but type value has been divided up into two factors, namely 7 and 1, and each type in the composite receives the value that it is entitled to.

Now when we look at the value of the various types in this light, we observe that if we cannot in our domestic units get absolutely a whole 32, 16, 8, 4, 2, it is possible to get almost a correct life-form by having the nearest value to them. We also observe that if these figures were kept up as 32, 16, 8, 4, 2, and not in factors, we could not possibly have fresh blood introduced; as the introduction of fresh blood would at once cause them to split into factors. But as fresh blood must be brought in to ward off deterioration it is necessary to have them as factors, and since we never can produce a unit in whom we can find absolutely "correct type" (5), the question at once arises,—

"What factor of 32, 16, 8, 4, 2, will give us good strong type, and enough fresh blood to ward off deterioration?"

In a word, "What is the strength required in the greater factor to produce good type in species, varieties, strains, and families, and to produce individual type as a family type, since we cannot reproduce individual type in an individual?"

Obviously it must be the next thing to 32, 16, 8, 4, 2, which we may place thus :—

Species.....	$31\frac{3}{32}\frac{1}{2} + \frac{1}{32} = 32$
Variety ...	$15\frac{15}{16}\frac{1}{16} + \frac{1}{16} = 16$
Strain	$7\frac{7}{8} + \frac{1}{8} = 8$
Family.....	$3\frac{3}{4} + \frac{1}{4} = 4$
Individual	$1\frac{1}{2} + \frac{1}{2} = 2$

But it must be also apparent that such a system of figures must be cumbrous in handling, and most perplexing to deal with, therefore we can simplify matters exceedingly by looking upon the value of each type thus :—

Species..... $\frac{32}{32}$
Variety ..... $\frac{16}{16}$
Strain ..... $\frac{8}{8}$
Family..... $\frac{4}{4}$
Individual ..... $\frac{2}{2}$

and in doing so we can represent the value of each type as 1.

Consequently we may have the value of type represented thus :—

Species ..... $\frac{31}{32}+\frac{1}{32}=1$
Variety ..... $\frac{15}{16}+\frac{1}{16}=1$
Strain..... $\frac{7}{8}+\frac{1}{8}=1$
Family ..... $\frac{3}{4}+\frac{1}{4}=1$
Individual..... $\frac{1}{2}+\frac{1}{2}=1$

In each unit we see a greater factor excepting in that of individual, the reasons for which I will explain when we come to deal with that especial type; but at present what concerns us is the question whether the greater factors given above will produce good type. I believe they will, and, if I can prove that this is so, it will solve a difficulty which many breeders have to contend with, namely, the odium that rests upon an exhibit that is supposed not to be pure-bred, because it has had a cross or a bar sinister somewhere in its ancestry.

This is utterly wrong, since it must be obvious that every variety, strain, and family must have a bar sinister, otherwise they could not exist. Fresh blood must come in sometimes, and I cannot suppose any life-form to exist without it, since if we trace it back we find that some other variety than its own is there, some other strain, some other family.

Good variety, good strain, good family type never can be found absolutely pure, it must be as the greater factor of a one. Let us see, then, if these factors such as I have given will do, and if they will, then we may look upon the types that contain them as pure, and the life-forms that contain the types as pure-bred, viz.:—

Species.—Without recapitulating, species will not breed together, consequently the value of this type will remain a whole—$\frac{32}{32}$.

Variety.—Now we have already seen that a variety, being, as it is, composed of a vast number of unrelated units, all of which have one type in common, viz. species, when the introduction of fresh blood is desired we do not inbreed to a single unit, otherwise we are breeding for a new family type, but we inbreed to the variety type through a number of units, after the introduction of another variety, viz. :—

Supposing that we had a number of basset-hounds that were commencing to degenerate, and that fresh blood was required, and that we could not obtain another basset, obviously we would have to employ some other variety to bring it in.

Now in the last chapter I explained that, by increasing the basset factors in the composite, we would return to basset type.

A whole then composed thus would give us perfect type, since

the lesser factor would have absolutely no hereditary power of representing its variety type at all, whatever it might be, viz. :—

$$\frac{\text{Basset}_{15}\text{X}}{16}$$

To advise such a proceeding as this would be farcical and ridiculous, nevertheless I may query whether many of our most typical varieties could show even so large a factor as this is, yet they are called pure. The reason for this is obvious.

Poor stock of all kind is gradually being improved in some direction, viz. :—

Let x represent a cow of no variety known, a complete mongrel, such as may be seen grazing on some hillside, nevertheless from it both a pure-bred Shorthorn or a pure-bred Hereford might very soon be manufactured, viz. :—

$$\begin{array}{c} \text{x} \\ \diagup \quad \diagdown \\ \dfrac{\text{Hereford}_{15}\text{x}}{16} \qquad \dfrac{\text{Shorthorn}_{15}\text{x}}{16} \end{array}$$

To do so, we should simply have to breed in to the two variety types through pure bulls, viz. :—

Let A represent the Hereford ; B the Shorthorn :—

$$\begin{array}{ccc} \text{A} + & \text{x} & + \text{B} \\ | & & | \\ \text{Ax} & & \text{Bx} \\ | & & | \\ \text{A}_3\text{x} & & \text{B}_3\text{x} \\ | & & | \\ \text{A}_7\text{x} & & \text{B}_7\text{x} \\ | & & | \\ \text{A}_{15}\text{x} & & \text{B}_{15}\text{x} \end{array}$$

By this time both $A_{15}x$ and $B_{15}x$ would have arrived at pure A and B.

Fresh blood in large varieties is constantly being added in this way, although we do or may not notice it, but in small ones which are nearly extinct it has to be done intentionally, as, for instance, in the case of the almost extinct Irish wolf-hound, which Captain Graham and other members of the Wolf-hound Club are, and have almost in a few years succeeded in, resuscitating.

A factor of $\frac{15}{16}$ wolf-hound will amply suffice to reproduce the variety type in all its purity.

Strains.—Possessing as they do already two types in common—viz., species and variety—both of greater value than that of strain type, the factor required for strain type will not, therefore, be necessarily so large as in the preceding cases.

Again, strains having but few unrelated units in their composition, a certain amount of inbreeding will be necessary ; conse-

quently in reproducing strain type, after the addition of a fresh factor, the unequal-factor system will have to be employed.

This we have already seen promotes type; consequently, for this reason also, the factor necessary for good strain type will be less than in that of species and variety. We have already seen that in crossing the Couteulx and Lane strains to give the former fresh blood, $\frac{\text{Couteulx}_3\text{Lane}}{4}$ was not sufficient, and that a further multiplication of the Couteulx factor was necessary. Hounds of $\frac{\text{Couteulx}_7\text{Lane}}{8}$ have now been bred, and amongst them I may mention "Chastelard." He has absolute purity of Couteulx type, consequently we may assume that the factor necessary for pure strain type is $\frac{7}{8}$.

Family.—Here again we find the distinctive value of type less, since families have not only species type in common, but variety type and strain type, consequently the value of the factor will be less.

Again, as families can have no unrelated units, inbreeding must at once ensue after the introduction of fresh blood.

Type therefore is more rapidly produced than in any of the former types, for this reason accordingly the necessary factor will be less. As an example, we have a complete instance of what the factor should be in this case, in fact quite as good as that in strain, viz. :—

$$\text{Fino V.}\ \frac{(\text{Fino de Paris}_3\text{Termino})}{4}$$

$\frac{3}{4}$ is then the amount required in family type.

Individual.—Now in breeding a single individual to another of the same family, we have four types in common—viz., species, variety, strain, and family—and when we mate members of the same family together there must be immediate inbreeding, consequently the factor is considerably less than in family type.

I have placed it as $\frac{1}{2}$.

Now when we come to consider that every fresh individual type, which must be different to any other, is formed on an equal-factor system, we find that $\frac{1}{2}$ is the proper factor, since every new individual type is a direct composite of two other individual types, viz. :—

$$\text{Fiddler}\ \frac{(\text{Fino V.} + \text{Igerne})}{2}$$

This must be obvious.

But if we desire to form a family type on an individual type, $\frac{1}{2}$ will not do this, although after a new family type has been established $\frac{1}{2}$ will.

Consequently we must have a factor somewhat over $\frac{1}{2}$ to commence with.

Now we may take as examples either the mode in which the Fino de Paris type came to be produced as a family type or of Bourbon, viz. :—

Fino de Paris
Trouvette
} Mignarde $\left(\frac{\text{Fino de Paris} + \text{Trouvette}}{2}\right)$ a composite.

Mignarde
Fino de Paris
} Finette (Fino de Paris$_3$Trouvette).

On arriving at this stage deterioration commenced, consequently fresh blood was required. Termino was then introduced, viz. :—

Finette
Termino
} Guinevere (Termino$_4$Fino de Paris$_3$Trouvette).

As, however, a bias was found in favour of Termino, Fino de Paris became again used, viz. :—

Guinevere
Fino de Paris
} Fino V. $\left(\frac{\text{Fino de Paris}_{11}\text{Termino}_4\text{Trouvette}}{16}\right)$

By this time the Fino de Paris individual type has become a family one, and by keeping up the factor we have in direct succession—

Fino VI. (a Fino de Paris factor of $\frac{9}{16}$ and three lesser ones).
Forester and Merlin (a Fino de Paris factor of $\frac{29}{64}$ and six lesser nes).
Comte de Paris ($\frac{5}{12}\frac{1}{3}$ Fino de Paris and six lesser ones).

It will now be apparent that in producing an individual as a family type something more is required than $\frac{1}{2}$; it should therefore be a factor ranging between $\frac{1}{2}$ and $\frac{3}{4}$, but as the type as a family one becomes established it may represent itself as $\frac{1}{2}$ or even less.

Again—

Bourbon
Theo
} Chopette $\left(\frac{\text{Bourbon} + \text{Theo}}{2}\right)$ a composite individual type. (Termino family type.)

Here fresh blood is required (as both Bourbon and Theo have exactly the same individual factors, though dissimilar in value), viz. :—

Chopette
Chassepot
} Chopette II. $\left(\frac{\text{Chassepot}_2\text{Bourbon Theo}}{4}\right)$

then

Chopette II.
Bourbon
} x $\left(\frac{\text{Bourbon}_3\text{Chassepot}_2\text{Theo}}{8}\right)$

Here we come back to Bourbon individual type as a family type, although it is generally called the Termino, because Bourbon, Theo, and Chopette all show the type of their prototype Termino. Nevertheless, $\frac{5}{8}$ appears to be the factor here, virtually the same as that required to establish the Fino de Paris individual type as a family one.

We may conclude, therefore, that to establish a family type from an individual one, a factor ranging between $\frac{1}{2}$ and $\frac{3}{4}$ is required at first, and as fresh factors come in it may be reduced, since the factor that gives the family type is out of all proportion

to the others that with it form the unit. As an example of this I give the whole factors of that remarkable litter Forester, Fresco, Merlin, Flora, viz. :—

$$\frac{\text{Fino de Paris}_{29}\,\text{Termino}_{12}\,\text{Ravande}_{4}\,\text{Trouvette}_{3}\,\text{Juno}_{8}\,\text{Model}_{4}\,\text{Fino}_{4}}{64}$$

It will now be obvious to my readers that since every unit must belong to a family, and a family to a strain, and a strain to a variety, and a variety to a species, all these various type factors have to be studied together; consequently, we may have units composed thus: That is to say, if we take as the standard-value of correct type as—

Species	$\frac{32}{32}$
Variety	$\frac{16}{16}$
Strain.....	$\frac{8}{8}$
Family	$\frac{4}{4}$
Individual.....	$\frac{2}{2}$

Nearly correct would be for established families—

Species.....	$\frac{32}{32}$
Variety ...	$\frac{16}{16}+\frac{1}{16}$ (differing)
Strain	$\frac{7}{8}+\frac{1}{8}$ (,,)
Family.....	$\frac{3}{4}+\frac{1}{4}$ (,,)
Individual	$\frac{1}{2}+\frac{1}{2}$ (,,)

Whilst to form new family type we may place it thus:—

Species.....	$\frac{32}{32}$
Variety ...	$\frac{16}{16}+\frac{1}{16}$ (differing)
Strain	$\frac{7}{8}+\frac{1}{8}$ (,,)
Family.....	$(\frac{11}{16}$ or $\frac{5}{8})+(\frac{5}{16}$ or $\frac{3}{8})$ (differing)
Individual	$\frac{1}{2}$ + $\frac{1}{2}$ (,,)

On the other hand bad type would be—

Species.....	$\frac{32}{32}$
Variety ...	$\frac{15}{16}+\frac{5}{16}$ (differing)
Strain	$\frac{1}{8}+\frac{4}{8}$ (,,)
Family.....	$\frac{2}{4}+\frac{2}{4}$ (,,)
Individual	$\frac{1}{2}+\frac{1}{2}$ (,,)

—in other words a pure mongrel.

Now there is a very good old axiom which many breeders hold to, namely, in breeding for good "type" you must breed "Twice in, once out;" but when you come to look at it carefully, it will be seen that the word "type" as applied to a unit is wrong, and that if we applied this axiom to varieties and strains, we should land ourselves in a hopeless mess—we should never reach even good variety or good strain type, consequently this is only an additional proof that there is not 1 type but 5.

Supposing for a moment that this axiom held good for variety type—just see what would ensue, viz. :—

$$\left.\begin{matrix}\text{Basset}\\ \text{Spaniel}\end{matrix}\right\}\frac{\text{Basset}+\text{Spaniel}}{2}$$

We have, therefore, bred once into the basset—

$$\left.\begin{matrix}\frac{\text{Basset}+\text{Spaniel}}{2}\\ \text{Basset}\end{matrix}\right\}\frac{\text{Basset}_3+\text{Spaniel}}{4}$$

We have now bred twice into the basset variety, consequently we should then have to breed out again, and the result would be

$$\frac{\text{Spaniel}_5\text{Basset}_3}{8}$$

and by doing so we should produce a composite variety type which would have a far greater preponderance in favour of the spaniel than the basset—the exact opposite to what we were breeding for; and a continuance of breeding twice in and once out would simply represent a balance at one time in favour of the basset and then of the spaniel.

No; the axiom can only apply to one of the types out of the five, which we will come to directly. Were it to apply to all five, or rather four since we cannot change that of species, it would reduce them all to a common value. It would signify that there was no difference between two brothers, no difference between family types, strain types, or variety types, and that the type of an individual or his individual characteristics were on a par with the value of the variety type that he belongs to.

Surely the difference between the characteristics or the individual type of Fresco and his brother Forester is infinitely more minute than the difference between the variety type of Fresco and the variety type of a retriever.

For these reasons and others that I might urge were I inclined, the axiom "Twice in, once out" cannot apply to the single word "type," since the word signifies that a life-form has only one type, whereas on the application of it to variety type we find it must be wrong; if there were no other reason at all, this in itself would prove the existence of more than one type.

We have already seen that to get good variety type $\frac{1}{8}$ may be represented by $\frac{1}{2}\frac{1}{4}$, and to do this we must breed four times in and once out.

In the case of strains, for the same reasons it will be, if a $\frac{3}{8}$ factor is desired, three times in, once out.

That this is the case, I give as an instance Mrs. Stokes' $\frac{\text{Couteulx}_3\text{ Lane}}{4}$ hounds. "Twice in, once out" was not enough. They were excessively good, but there was just enough Lane in them to show that the cross had been employed.

The $\frac{\text{Couteulx}_7\text{ Lane}}{8}$ show no Lane in their composition, consequently "three times in, once out" is the axiom when applied to strain type.

But in the case of family type, that is to say an already established family type, the axiom is correct ; $\frac{3}{4}$ is the factor required ; consequently, if we look back to the introduction of fresh blood into the Fino de Paris family, we see that Fino V. has a family type factor of $\frac{3}{4}\ \frac{(\text{Fino de Paris}_3\ \text{Termino})}{4}$, which is the result of breeding twice in, once out.

But when we come to individual type, which is always a composite, the axiom no longer holds good—$\frac{1}{2}$ is the factor required here. Fiddler represents the individual types of Fino V. and Igerne, as a composite—half of one and half of the other. We do not breed twice in to Fino V. and once out to Igerne, but once to each. Therefore it is $\frac{\text{once in, once out}}{2}$, and in breeding for individual type, whether you like it or not, the axiom must be "once in, once out."

No longer either is the axiom correct in breeding to an individual type to form a new family type. Something midway between $\frac{1}{2}$ and $\frac{3}{4}$ is required, and we observe that in breeding, to form both the Fino de Paris family and the Termino family as represented by Bourbon, we were obliged to breed twice in, once out, once in, in the case of the Fino de Paris, and twice in, once out, once in, in the case of Bourbon (Chopette being the same type as Bourbon). The axiom, then, for producing a new family type is "twice in, once out, once in."

In conclusion, then, we may deduct the following rules for the formation of good type, viz. :—

Species type represents—
Variety $\frac{1}{16}+\frac{1}{16}$, or four times in, once out.
Strain $\frac{7}{8}+\frac{1}{8}$, or three times in, once out.
Family $\frac{3}{4}+\frac{1}{4}$, or twice in, once out (established).
Individual $\frac{1}{2}+\frac{1}{2}$, or once in, once out.

Or,

Species $\frac{3}{3}\frac{2}{2}$.
Variety $\frac{1}{16}+\frac{1}{16}$. Four times in, once out.
Strain $\frac{7}{8}+\frac{1}{8}$. Three times in, once out.
Family $\frac{1}{16}+\frac{6}{16}$, $\frac{9}{16}+\frac{7}{16}$, $\frac{2}{8}+\frac{3}{8}$ (the lesser factors being made up of others). Twice in, once out, once in. (To establish.)
Individual $\frac{1}{2}+\frac{1}{2}$. Once in, once out.

CHAPTER X.

TRUE SPORTS AND PSEUDO-SPORTS—THEIR ORIGIN AND PROPAGATION.

Now when we come to compare species existing in a wild state with species existing in a state of domesticity, we cannot help being enormously struck with the comparative poverty of the wild species as regards variety, strain, and family types, as compared with the same species in a state of domestication.

How is it, then, that we have such a large variety, &c., compared with nature?

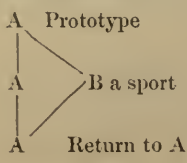
I have already said that it is owing to selection, but selection alone would not do this.

Man never for a moment "imagined" any of the types we have produced. Man never dreamed of a type, and then by a process of selection began to reproduce his ideal in a life-form. He could not do this. He can do a good many things, but he cannot theoretically form a variety, strain, family, or individual type, and then set to work to produce it in life or living form.

He must have it first produced by nature, and then he can by selection increase it into family, strain, and variety type, and modify those if he likes; but he cannot, as it were, draw one in shape such as a dragon and then bring it into life, in the same way as Pygmalion did Galatea, or Coleridge under the influence of opium did "The Ancient Mariner." Nature must first produce a type, and then she can, if she finds it necessary, reproduce it. Nature must first produce a type, or man cannot artificially reproduce it and bring it to possible perfection.

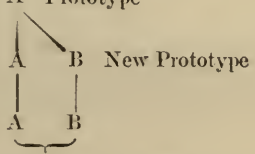
Now the true reason that nature has so few types and man has made so many is as follows, viz. :—

Directly a new type appears in nature, unless it is assisted by some extraordinary circumstance, it has no chance of reproducing itself, consequently it becomes subservient to the type that it strayed from, and again becomes incorporated with the prototype or life-form that it should have resembled, viz. :—



Thus B becomes again extinct.

Man on the other hand observes this, and knows that, if he surround B as a sport with favourable circumstances, B will in due time reproduce itself, consequently we may exemplify nature under favourable circumstances, and man by artificial circumstances, thus—



Both A and B continued as differing life-forms or types.

Having now arrived at this example, it would be well to pause and go back a little. When the great Darwin commenced his experiments upon the Blue-rock pigeons, which we may look upon as the first prototype A, he finished by producing from them a variety of differing types B, and from this he argued that, if the new types B were produced from the prototype A, every variety in nature was similarly produced; every species too, and so he got back to original life, the prototype of all.

It is plain, therefore, that when life rose from a non-sexual state to a Hermaphrodite age, great inbreeding took place, and again, as life rose to one in which two separate sexes were produced, great inbreeding must again have gone on to reproduce distinctive type.

Now, the Bible says that Adam and Eve, whom we may look upon as prototypes, as far as man and woman are concerned, were the first of their kind, consequently between Adam and his offspring great inbreeding must have taken place, and also between their offspring, to further this particular type, our own particular species type, or else there must have been some other life-forms of a similar type extant.

Now, we have seen that if a species, if a variety, if a strain, if two individuals remain isolated, they must eventually deteriorate, degenerate and cease to exist. This is undoubtedly the case, consequently had Adam and Eve been prototypes, without any other allied type, they could not have been the only parents, as it is commonly believed they were, of the present human world.

In the sexless stage of the world fresh blood was not necessary, in the Hermaphrodite stage not absolutely necessary; but when we come to the stage in which there are two sexes, and an exceedingly high organisation, fresh blood is absolutely necessary, and we can only suppose that units have the power, as they become distantly related and then unrelated by constant sub-division, to renew the blood or bring fresh blood to inbred units of the same species, and sprung from a similar prototype.

Hence every species, every variety, every strain, every family,

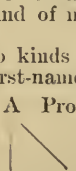
every individual, must have one allied to it, which although unrelated may bring to another fresh blood.

We can only look upon this as the means by which any individual has risen to a species by progressive steps, or any type from species to family been saved from certain extinction.

If then we look upon B as the first of his kind "Adam," and A as the previously existing life-form from which he came, we will arrive at the solution of a question which puzzles many, namely, verses 15, 16, Genesis iv., in which allusion is made to Cain's expulsion, and his marriage with a daughter of the land of Nod. If Cain was the first son of Adam and Eve, and was dismissed from their presence for the murder of his brother Abel, and, on his arrival in the land of Nod, married a daughter of the land, there must have been an allied race in existence of a previous age to Adam; consequently, if we make use of B as Cain and A as the daughter of the land of Nod, we will understand how Adam must simply have been a new prototype, and the wife of Cain the type of a race from whom "Adam" or a fresh type had variated. Under no other circumstances can we imagine any higher life-form to reproduce itself in abundance and vigour, such as both man, beast and fowl have continued for ages to do.

When then I look upon Adam not as the first "man" as an individual, I may be permitted to say that I look upon him as a typical example of an "Adam" or first man of his kind, a variation from another kind of man, a true sport; Eve another of a similar character.

Now there are two kinds of sport, a true sport and a pseudo-sport, but with the first-named I will commence, viz.:—



A must necessarily have five types—species, variety, strain, family, and individual.

Its offspring A has the same, with the exception of individual type, which of course differs; x its offspring on the other hand has five types too, but they all differ excepting in that of species. In fact, x has so variated that you would unhesitatingly say he belonged to another variety of the same species, until you know there was none other like him.

He then is a true sport, and in himself contains the first type of a new variety, strain, family, and individual type. He is, if cultivated, a prototype in himself. He is an "Adam"—x is in a word an original life-form from whom a family type can be formed, from whom a strain can be formed and from whom a large variety can be produced, with numerous strains, families, and individuals; x is an "Adam" from whom a small world of his kind can arise.

How can we account for the seeming anomaly of A giving birth to such form as x?

To understand this we must return to Chapter I. There we will have observed that the first step nature took to develop the enormous and complicated mass of variations which at present make up the sum of life was the production of a life-form, variating from the first and original prototype of all, whatever might be the causes which brought about the change. Since that first step, every unit in the world has inherited the power of that first variation—namely, that of variating too, and of in thi way adding a fresh variation to the already colossal fabric (Chapter II).

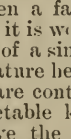
Although, then, it may appear extraordinary to see x differing from A, in reality we see nothing more than the tendency nature has ever shown towards variation, since the first life-form graced the earth with its presence.

x then is in reality no sport or freak or eccentricity of nature, it is the result of a cause, the nature of which we do not fully understand; all that we do know is that it is nature's habit, a habit which man vainly attempts to correct and to curb.

It is for this reason that I say man cannot form a theoretical sport and then proceed to produce it. We now see why nature has so few varieties and man so many in some half-a-dozen distinct species; we now see why it is that it would be impossible for there to be a large number of varieties of the same species in nature, all living side by side. No sooner is a sport produced by nature than nature at once brings it back to the type it has strayed from; it has not the chance of raising itself or advancing to the dignity of even a family. Man, on the contrary, seizes greedily on a sport if it is worth cultivating, and the result is the vast variety of types of a single species we now possess, far out of proportion to what nature herself would have permitted.

Such sports as x are continually being produced, more often, perhaps, in the vegetable kingdom than the animal; and, as a consequence, we have the reproduction yearly of many new varieties, some of which have entirely eclipsed the varieties which gave them birth. Into the question of their cultivation I will not go, since we have not to do with new varieties, but those already in existence. It will be, however, sufficient when I say that, as a sport is a single unit containing the elements of four new types, "twice in, once out, once in" will bring him quickly to a family, and from this his development into strain and variety is but a question of time.

Pseudo-Sports.—Now, in dealing with units under this heading, we have something of an entirely differing description before us, viz. :—



A here, just as in the previous example, represents the prototype, and has five types—viz., species, variety, strain, family

and individual—so has its offspring A, with the exception of differing individual type.

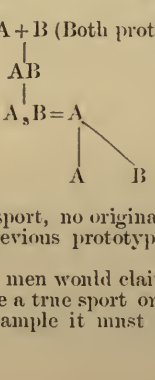
But B, the pseudo-sport, although it has species and variety in common, or more likely species, variety, and strain in common, yet it differs in family and individual type.

Now, in dealing with this, I will leave out the question of strain, since what applies to family applies equally to that of strain type.

Assuming, therefore, that B differs from its prototype A in family and individual types, the question naturally must arise, just as it did in the question of true sports, "What is the reason?" and, in giving the answer to this question, I may say that a definite one can be given, and of a reasonable nature. In the first place B is bound to differ in individual type: therefore, we are left with only one, viz., family.

It will be remembered that I have said no family, no strain, no variety can be absolutely pure; since to aid in developing them, differing, yet allied blood, must necessarily be brought in, otherwise they would perish from inbreeding; we must, therefore, suspect that this addition of fresh blood is the cause, and we are further led to this surmise, because B represents the type of a family which existed or is still in existence.

How, then, does A produce B, when B as a type already has its own prototype elsewhere? To answer this, we must look to the pedigree of A, and we will find not very far from A that B, the prototype, was introduced (not B, the pseudo-type) to keep A type from breaking down from an abuse of the unequal-factor system, and to aid in A's development as a family. We will also find that A as a prototype, compared with B as a prototype, is new, and being new has not established itself sufficiently to extinguish the hereditary power of B as a factor in its composition. The outcome of this is that B reasserts its family type in one or two of A's produce, not of course as strong B type, but as weak. The pseudo-sport B has, then, reverted to a previous prototype, viz.:—



B then is no true sport, no original life-form, but a somewhat weak example of a previous prototype; he is then a pseudo-sport or false sport.

Nevertheless, many men would claim B, without knowing how he came to exist, to be a true sport or an original type, but from the accompanying example it must be obvious that this is not the case.

The actual reason for the appearance of these so-called sports, or in reality pseudo-sports, is because fresh blood of another family has been introduced, or if it be in strains because a fresh strain has been imported into them from another strain, and we only find it in freshly formed strains or families, not when they have settled down into recognised strain or family types.

An example as far as strains go, I do not give, as I have said, in this pseudo-sport question, it matters little whether it be in strains or families. One, however, in families I will give, as it is most interesting and appropriate, viz. :—

When Comte Couteulx bred Fino de Paris to Trouvette, the first step towards the formation of the Fino de Paris family, now so well known in this country, he followed it up by putting the produce, "Mignarde," to her own sire, Fino de Paris, thus bringing about Finette $\left(\frac{\text{Fino de Paris}_3\text{Trouvette}}{4}\right)$.

Degeneration stepping in, he sent Finette to Termino, a hound of another family. The produce of this union was Guinevere and Theo $\left(\frac{\text{Termino}_4\text{Fino de Paris}_3\text{Trouvette}}{8}\right)$.

Both Fino de Paris and Guinevere (and Theo) were then imported into England by Mr. G. Krehl, who at once mated them together, producing

Fino V. Bourbon $\left(\frac{\text{Fino de Paris}_{11}\text{Termino}_4\text{Trouvette}}{16}\right)$.

Both these two hounds have the same pedigree, the same factors necessarily, and are litter brothers, yet Fino is true to his prototype Fino de Paris, whilst Bourbon is a pseudo-sport and untrue, but true to his prototype Termino, viz. :—

Fino V.

Species.....	$\frac{32}{32}$	Dog
Variety ...	$\frac{16}{16}$	Basset Hound
Strain	$\frac{8}{8}$	Conteulx
Family.....	$\frac{4}{4}$	Fino de Paris ($\frac{1}{4}$ Termino)
Individual	$\frac{2}{2}$	Fino de Paris ($\frac{1}{2}$ Guinevere).

Bourbon,

Species.....	$\frac{32}{32}$	Dog
Variety ...	$\frac{16}{16}$	Basset Hound
Strain	$\frac{8}{8}$	Conteulx
Family.....	$\frac{4}{4}$	Termino ($\frac{3}{4}$ Fino de Paris)
Individual	$\frac{2}{2}$	Guinevere ($\frac{1}{2}$ Fino de Paris).

Family type then in Fino V. is represented by the greater factor, Bourbon by the less; Fino V. represented by one half of his individual type factor, Bourbon by the other.

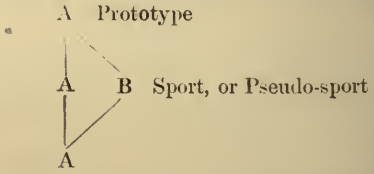
Now, had Fino V. and Bourbon been imported bassets, instead of being born in England, it would have been impossible to say which was true to his factor and true to his prototype, Fino de Paris, which was untrue, and therefore a pseudo-sport.

Fortunately, however, Fino de Paris was in England, and

numberless other hounds, true to their factors also, accordingly we are able to distinguish that Fino V. is not the pseudo-sport.

On the other hand we have had several examples of the hounds emanating from the kennels of Mons. Masson, the owner of Termino, and since Bourbon resembles them we can at once say that he is a pseudo-sport, and has reverted to the family type of Mons. Masson's hounds. Such an example, it will be seen, is most typical, but owing to this peculiarity of a previous type appearing—of a unit representing a type by the lesser factor instead of the greater—the cultivation of a pseudo-sport is a matter of some difficulty, and a question which has to be carefully studied.

Now, at the commencement of this chapter we saw that nature, if circumstances were not favourable, brought the true sport or the pseudo-sport back to the type which they should have followed. Of course I do not mean that the sport or the pseudo-sport become themselves changed, but their offspring or descendants come back to the original type, viz. :—



This must be obvious if we look at it in this light, viz. :—

$$\left.\begin{array}{l}\text{The Pseudo-sport representing B type } A_3B \\ \text{A unit true to its factor} = \text{A type } A_3C\end{array}\right\} = \frac{A_6BC}{8}$$

The result is that we increase the A factor, decrease the B, and the unit returns to the type (A), which the pseudo-sport should have represented, but did not.

In a word, then, a pseudo-sport is a unit which is untrue to his greater factor, and has reverted to a previous family or strain as the case may be.

Now in the case of the basset-hound I only know of one example of Bourbon, the pseudo-sport, reproducing his own family type with a female of Fino de Paris type; in every other case the produce are of Fino de Paris family type, and a composite individual type $\frac{\text{Bourbon x}}{2}$ (x representing the individual type of the dam). How then are we to reproduce the family type which the pseudo-sport represents?

There are three methods, viz. :—

1. Breeding the pseudo-sport with a unit, who has a greater factor of the prototype the pseudo-sport represents, by a lesser factor.
2. Breeding the pseudo-sport with a unit, who has no factors in common with him.

3. Breeding the pseudo-sport with the family that he belongs to, but whose type he does not represent.

In every case we must breed twice in, once out, once in; but in case No. 1 we are breeding to the prototype of the pseudo-sport's type, in cases 2 and 3 we are breeding to the pseudo-sport as a prototype himself.

No. 1 is by far the best, as we shall see; No. 2 not so good; No. 3 the worst.

Now, if we take an example of these, we shall see why this is so.

I have said that Bourbon was a pseudo-sport, consequently he is a weak example of his prototype Termino. In breeding from him, then, to reproduce Termino, it is obvious that the Termino factor must be increased in his (Bourbon's) produce, and to do this a unit must be found with a large Termino type factor.

Now supposing that there were a number of such units extant, Termino as a family type could be at once revived, but in the case of Bourbon there were only two in England, viz., Guinevere, his dam, and Theo, her sister. Fortunately, he was mated with Theo, when we have case 1:—

The result of this cross was the birth of—

$$\text{Chopette}\left(\frac{\text{Fino de Paris}_{17}\,\text{Termino}_{12}\,\text{Trouvette}_{3}}{32}\right).$$

We have now bred once in to the pseudo-sport, we have also inbred, since both the pseudo-sport and Theo have factors in common though differing in value; we have also had two units of similar type together, consequently in Chopette we have stronger Termino type than either her sire or her dam.

But we have only produced one unit and not a family, consequently we must go on, but it must be borne in mind, though we are going to breed out, we are also breeding in, not to the pseudo sport, but to Chopette, who is the same type but still stronger. In the following alliance then we breed, for the second time, in to the Termino family type and once out, viz.:—

$$\left.\begin{matrix}\text{Chopette}\\ \text{Chassepot}\end{matrix}\right\} =$$

$$\text{Chopette II.}\left(\frac{\text{Chassepot}_{32}\,\text{Fino de Paris}_{17}\,\text{Termino}_{12}\,\text{Trouvette}_{3}}{64}\right)$$

Now, the reason I advised Chassepot, a $\frac{\text{Conteulx Lane}}{2}$ hound, was because no hound other than related and bearing a large Fino de Paris factor could be found. To breed thus would have brought the produce back to Fino de Paris type (family).

Therefore, the produce of Chopette was $\frac{\text{Conteulx}_{3}\,\text{Lane}}{4}$. For this reason, the offspring, Chopette II., on being bred to Bourbon, not only brought back Conteulx strain type, but were the result of breeding in once again. These hounds I shall name x, since

they have not yet been named. If this breeding be not understood, I will put it in this form :—

Once in ..... Bourbon – Theo

Once in, once out..... Chopette – Chassepot

Once in .... Bourbon – Chopette II.

x

Now, if we compare these hounds—viz., Bourbon and x—together, we will observe that we have returned not only to Bourbon himself but to his prototype Termino, viz. :—

Bourbon.	Species.....	$\frac{32}{32}$ Dog
	Variety ...	$\frac{16}{16}$ Basset
	Strain	$\frac{8}{8}$ Couteulx
	Family.....	$\frac{4}{4}$ Termino ($\frac{3}{4}$ Fino de Paris)
	Individual	$\frac{2}{2}$ Guinevere ($\frac{1}{2}$ Fino de Paris)
x.	Species.....	$\frac{32}{32}$ Dog
	Variety ...	$\frac{16}{16}$ Basset
	Strain	$\frac{7}{8}$ Couteulx ($\frac{1}{8}$ Lane)
	Family.....	$\frac{3}{4}$ Termino ($\frac{1}{4}$ Chassepot)
	Individual	$\frac{1}{2}$ Bourbon ($\frac{1}{2}$ Chopette II.)

But Bourbon and Theo are Termino type, therefore the family type of these hounds (x) is Termino. Consequently, if Bourbon as a pseudo-sport is represented by $\frac{1}{4}$, they, as true to their factors, are $\frac{3}{4}$ Termino type, which we have seen to be enough for established family type. They are also $\frac{5}{8}$ Bourbon type, which is sufficient to form a new family type, but, as that new family type is on the individual type of Bourbon, and Bourbon, the pseudo-sport, represents Termino, it will be agreed on both sides that the Termino family type has been reproduced.

But having done so, we must no longer look upon their factors as having Fino de Paris in them, since we have produced a race of Termino hounds in which type is represented by a new Termino one, viz., Bourbon.

These individual factors, then, instead of being—

$$\frac{\text{Fino de Paris}_{61}\,\text{Termino}_{28}\,\text{Chassepot}_{32}\,\text{Trouvette}_{7}}{128}$$

are

$$\frac{\text{Bourbon}_{5}\,\text{Chassepot}_{3}\,\text{Theo}}{8}$$

Thus, Bourbon is their prototype, although he is a pseudo-sport himself, and in reproducing him you reproduce his prototype Termino.

Case No. 2.—Here we have a suppositious case that no unit can be found with a large Termino factor. Consequently, we must

breed out at once; at the same time we must, although we know Bourbon to be a pseudo-sport, look upon him as a true sport, as a prototype in himself, and breed to him exactly as Comte Conteulx began the Fino de Paris family with Fino de Paris, viz. :—

A = Bourbon, BC = fresh blood—

Once in..... $A+B$

Twice in ... $AB+A$

Once out ... A_3B+C

Once in..... C_4A_3B+A

$$\frac{A_{11}C_4B}{16}=A$$

A type here will, however, be weaker than the last, but the factors will be much the same, viz. :—

$$\frac{A_{11}C_4B}{16}$$

Case 3.—Here a Termino factor (small) may be present or not, whilst there will be sure to be a large Fino de Paris one. The consequence of this will be, if the small factor be that of the pseudo-sport's prototype, that the pseudo-sport will reproduce himself at once, but if there be no such factor, then the first produce will be of Fino de Paris type. Again, breeding in we will get a weak type of the pseudo-sport. Fresh blood must then come in, which will destroy the weak type. Once in again will bring back individual likeness and fair family type, viz. :—

(a) A small Termino factor—

$$\text{Bourbon}+\text{Vivien}\left(\frac{\text{Fino de Paris}_7\,\text{Termino}_4\,\text{Ravande}_4\,\text{Trouvette}}{16}\right)$$

Bean — Good type (Termino)

(B) No Termino factor.

A = Bourbon.

B = Fino de Paris bitch.

Once into A..... $A+B$

Twice in ..... $A+AB$ (Fino de Paris)

A_3B (weak Termino)

Once out ..... A_3B+C (Fresh blood)

$A+C_4A_3B$ (Termino destroyed)

Once in ..... $\frac{A_{11}C_4B}{16}$ (Faint Termino)

In conclusion then we may say :—

1. That true sports are the result of a natural action of which we know nothing, but they can be reproduced.
2. Pseudo-sports are the result of introducing fresh blood, and are only found in newly established families.
3. Pseudo-sports can be bred from in three ways, viz. :—
   (A) To reproduce their prototype.
   (B) To reproduce themselves as prototype.
   (C) ,, ,, ,, ,,

CHAPTER XI.

VALUE, USE, AND REDUCTION OF PEDIGREE.

WE have now to do with a subject which might have been Chapter I. of this work or any other, but I have preferred to keep it for the last but one. It is that of pedigree, its value and use.

Every life-form on this earth, every unit, be it of the highest organisation, such as man, or the very lowest, such as a single cell, has a pedigree, and no life-form of any kind can have existence without one.

If we look through the pages of the Bible we see that it is, apart from its religious character, a history of the rise of the Jewish nation, the pedigree of the most advanced race of men of that time. Nothing strikes us more than the care with which the descent of the people is treated, and, notwithstanding the overthrow of the nation and its dispersal into all parts of the earth, the genealogical tree has been carefully preserved. It is, indeed, one to be proud of, since it shows the rise of a people from a single unit, and what is more, the most talented people in the world, the most artistic, the most musical, the most wealthy, and, most unreasonably, the most despised. Pedigree has always been the first subject of interest to man since he became a civilised being. Even the most primitive nations record their descent, celebrate it in verse; it shows where they came from and who they are, and in latter days there are few who have not dipped with wonder into the pages of "Burke" and "Debrett."

Speaking of the latter work, the late Lord Cairns says "It is a depository of information which I never open without amazement or admiration."

I most thoroughly endorse every word the late Earl makes use of, and I say more, "in breeding we cannot hope to succeed without making use of the information that pedigree gives us."

One of the very first questions a man asks when he buys any kind of stock is, "How is it bred?" This in other words is, "What is its pedigree?" and, as a rule, he receives with the unit in question a written or printed slip, viz.:—

Name of unit
Date of birth
- Sire
  - G. sire
    - G. grandsire
    - G. granddam
  - G. dam
    - ,,
    - ,,
- Dam
  - G. sire
    - ,,
    - ,,
  - G. dam
    - ,,
    - ,,

and in the place of sire and dam, &c., are written names, some of which are frequently prize-winners, and, as a rule, the greater the number of prize-winning names the pedigree contains, the higher in all probability will be the price asked for the unit to which the pedigree refers.

Pedigree then has a pecuniary value, and I am sorry to say that to a large class of men this is its only value. Again, how often do we meet a friend who delights to inform us that he has a horse descended from a winner of the Derby; a cow bred from a winner at the Agricultural Show; a fowl from the cup bird at the Crystal Palace; or a dog, a basset, bred down from Champion Fino de Paris.

Being a connoisseur in one of these species or of the variety that the unit belongs to, you may very likely smile not with disbelief, but at the simple faith of your friend in supposing that because the unit in question has a prize-winner for an ancestor or perhaps a parent, it is of greater value than any one else's.

Your friend is probably nettled at your cynical smile, and tells you sharply that since you don't believe him, which is in itself quite a mistake, he will show you the pedigree.

In such a case as this the value of pedigree is synonymous with the amount of pleasure it gives a man to tell you that the unit has a pedigree, and that it contains a prize-winner's name in it.

The unit itself may be a well-bred one or it may be bad, and the owner in a delightful state of ignorance which it is. It might be a possible champion or be the first to receive its *congé* at the hands of the judge. Still that it has descended from a prize-winner is all that our friend cares, and this is the value of the pedigree to him.

Here is a possible instance of what the pedigree of our friend's unit might be—

Bob
- Champion Plinlimmon (St. Bernard)
- Champion Duchess (Bloodhound)

Both sire and dam are champions, but although Bob is of the same species he is a mongrel as far as variety, strain, family, and individual types are concerned. Poor Bob is not valued, it is his pedigree, which in this case is absolutely worthless.

The value of pedigree in this light is exactly the same as the superior value a man has, in the eyes of a snob, who is descended from or related to another in the peerage, or that it is *infra dig.* to put your hands to honest work, as we lately had an instance in the

"Daily Telegraph" under the heading "What are we to do with our daughters who have the misfortune to be related to a baronet on their mother's side?"

In every one of these cases the value of pedigree in its true sense is misconstrued, and I cannot sufficiently deprecate the fashion of looking upon the value of pedigree in this light.

The true value of pedigree is the use to which we can put the information it affords us. Its true worth lies in the knowledge it supplies the breeder with—with the antecedents of a unit, of the crosses that have taken place, and the alliances of the immediate ancestor of the unit. By it we can see whether a unit has been bred on an equal or unequal-factor system, whether it ought to have fresh blood added to its progeny, whether by mating it with another we shall obtain good types or bad, whether it has a right to the types it represents or not. Again, it must be apparent that it will show us whether a unit is a true sport or a pseudo-sport, and to reproduce a known type of any kind, a sport as a family; to bring back a pseudo-type to his prototype or to cultivate him as a prototype, a knowledge of pedigree is absolutely essential—otherwise we are breeding, as Mons. Frechon says of his countrymen, "for luck," and exactly as many of our countrymen do too.

A man who breeds in this way, whether he be a Frenchman or an Englishman, without any definite plan in his mind, is nothing more than a "Micawber"—a man who is waiting and hoping for something to turn up. Now a written pedigree is usually a useless, bulky, and unwieldy instrument to deal with, and as a rule it is only the individual pedigree of the unit. Nothing in it is said about what family the unit belongs to, what strain, and when we buy a unit of a variety we get its individual pedigree, but we must not forget that just as a unit is an individual of a family, of a strain, of a variety, of a species, so the unit has five identical pedigrees.

Fortunately, however, we never worry ourselves with the variety and species pedigrees, but if we have to do with breeding for high competition, individual, family, and strain pedigrees are necessary.

Supposing now we take such an (individual) pedigree as there is, viz.:—

$$\text{Lynette} \begin{cases} \text{Ramée} \\ \text{Blanchette} \end{cases}$$

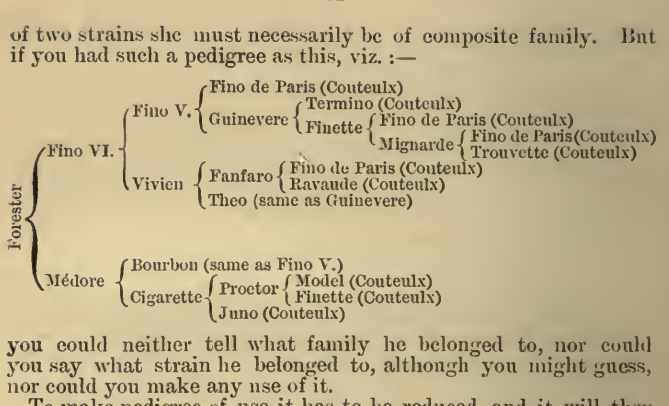
How could you tell what family Lynette belonged to, what strain? You would certainly note that it has a basset hound (variety), and a dog (species), but you could not say what family or strain she belonged to. But if you had it written thus, viz.:—

$$\text{Lynette} \begin{cases} \text{Ramée (Coutenlx strain)} \\ \text{Blanchette (Lane strain)} \end{cases}$$

you might by a roundabout way find it out, viz.:—

Ramée the sire, and Blanchette the dam, are differing strains, *ergo*, Lynette is a composite of the two, and as she is a composite

of two strains she must necessarily be of composite family. But if you had such a pedigree as this, viz. :—



you could neither tell what family he belonged to, nor could you say what strain he belonged to, although you might guess, nor could you make any use of it.

To make pedigree of use it has to be reduced, and it will then appear whether a unit has a right to a family type and a strain type. It will also show his individual factors, his family factors, and his strain factors; and if these be compared with the standard value of "correct type" it will be at once seen whether he is good or bad type, as the case may be.

The reduction of individual, family, and strain type is brought about as follows, and in each case the pedigree must be reduced to the arithmetical unit 1.

We have already seen that a unit is composed of a certain number of factors, that form the numerator and denominator, and that the value of them is comprised as follows :—

Unit.	Parents.	G. Parents.	G.G. Parents.	G.G.G.Parents.	etc., etc.
1	$2-\frac{1}{2}$'s	$4-\frac{1}{4}$ths	$8-\frac{1}{8}$ths	$16-\frac{1}{16}$ths	etc., etc.

and wherever we come to a stop in the pedigree, we must only add up that stop, viz., as italicised :—

Fino V. { *Fino de Paris* (Couteulx)
Guinevere { *Termino* (Couteulx)
Finette { *Fino de Paris* (Couteulx)
Mignarde { *Fino de Paris* (Couteulx)
Trouvette (Couteulx)

If, then, we add these stops up we get the following sum :—

Fino de Paris $(\frac{1}{2}+\frac{1}{8}+\frac{1}{16})$ + Termino $\frac{1}{4}$ + Trouvette $\frac{1}{16}$, or

$$\frac{\text{Fino de Paris}_{11}\,\text{Termino}_{4}\,\text{Trouvette}}{16}=1 \text{ (Individual Factors).}$$

This shows us at once that Fino V. is individually $\frac{1}{2}$ Fino de Paris, $\frac{1}{2}$ Guinevere, and has a right to be called a Fino de Paris hound, since he has $\frac{11}{16}$ of Fino de Paris in him. At the same time he has $\frac{3}{4}$ of the old blood and $\frac{1}{4}$ of the new, so that as a new family founded on Fino de Paris's individual type, or as an

established family in which new blood has been brought in, he is Fino de Paris family type either way.

Then he is $\frac{\text{Fino de Paris, Trouvette}_3 + \text{Termino}}{4} = 1$ Family factors,

or, $\frac{\text{Fino de Paris}_{11} + (\text{Termino}_4 \text{Trouvette})}{16} = 1$ Family factor.

Lastly,

$$\text{Couteulx } \tfrac{16}{16} = 1 \text{ Strain factor.}$$

Compare him now with the value of correct type in Chapter IX., and he will be found nearly correct (points of course I do not include).

Again,

Nancy { *Jupiter* (Couteulx)
Carillon { Fino de Paris (Couteulx)
Blanchette (Lane)

Individual Factors $\frac{\text{Jupiter}_2 + \text{Fino de Paris} + \text{Blanchette}}{4} = 1$

Family ..... $\frac{\text{Jupiter}_2 + \text{Fino de Paris} + \text{Blanchette}}{4} = 1$

,, ... $\frac{\text{Jupiter}_2 + (\text{Fino de Paris} + \text{Blanchette}}{4} = 1$

Strain ..... $\frac{\text{Couteulx}_3 \text{Lane}}{4}$

Now compare this hound with the nearly correct standard of type ab at its highest value, when it will at once appear, though she is correct in individual type, she is deficient in both family and strain.

The reduction, then, of these three pedigrees in a unit is of the highest value; since, if a man has the intention of mating two units together, by writing out the pedigree of the possible produce, and bringing them down to numerical units of 1, he will at once see whether the produce will reach the value of nearly correct type, or if not quite that, so near as to be called good.

Now, a great many pedigrees are too long, and for this reason. It is frequently supposed that by going as far back as it is possible it adds value to the pedigree. This is a great mistake, since at the place where a great name is mentioned, the pedigree should stop. If we again look at the pedigree of Fino V. we find it stops at Fino de Paris, Termino and Trouvette. Now, every variety, no matter what it is, has a prototype. In the case of the basset-hound, one of these is Fino de Paris; we therefore stop at Termino and Trouvette as subservient to him; consequently, we make them all stops and we come to the final stop, where the first alliance of Fino de Paris is found. It is absolutely useless putting in the pedigree of Fino de Paris to encumber the pedigree, since we are not breeding to his parents, but to him; nor would we,

even if we had it, put in the pedigree of Termino or Trouvette. They are useless, too, as they are quite subservient.

When, however, we come to deal with a pseudo-sport, such as Bourbon is, although he was descended from Fino de Paris, Fino de Paris is no longer the hound we desire to reproduce; it is Termino, consequently Fino de Paris and Finette become subservient and we limit the pedigree at them, viz. :—

$$\text{Bourbon}\begin{cases}\text{Fino de Paris}\\ \text{Guinevere}\begin{cases}\text{Termino}\\ \text{Finette}\end{cases}\end{cases}$$

and we try to increase the Termino factors in the produce, if we can find another unit with a large Termino factor, but althongh Bourbon is the pseudo-sport we make him a new prototype.

Thus, in forming a family after his individual type, we limit the pedigree with him and call it Termino, viz. :—

$$\text{x}\begin{cases}\text{Bourbon (Couteulx)}\\ \text{Chopette II.}\begin{cases}\text{Chassepot }\dfrac{\text{(Couteulx - Lane)}}{2}\\ \text{Chopette}\begin{cases}\text{Bourbon (Couteulx)}\\ \text{Theo (Couteulx)}\end{cases}\end{cases}\end{cases}$$

$$\text{Individual Factors }\frac{\text{Bourbon}_5+\text{Chassepot}_2+\text{Theo}}{8}=1$$

$$\text{Family .....}\frac{\text{Bourbon}_5+(\text{Chassepot}_2+\text{Theo})}{8}=1$$

$$\text{,, ...}\frac{\text{Bourbon}_5+\text{Theo}+(\text{Chassepot}_2)}{8}=1$$

$$\text{Strain .....}\frac{\text{Couteulx}_7\text{Lane}}{8}=1$$

Whatever unit then the breeder desires to reproduce, that unit becomes the prototype, and the pedigree terminates with him or her. All other prototypes become subservient. We must do this, or a pedigree very soon becomes enormous in size and unwieldy. In conclusion then—

1. A pedigree must stop at the unit we make the prototype.
2. It must be reduced to individual, family, and strain factors.
3. Its value is as stated.

CHAPTER XII.

THE RISE OF A UNIT TO A STRAIN, AND THE PRECEDENCE OF THE FAMILIES IN IT.

WE have now to do with a question of considerable importance in breeding, namely, the relative position that one family has in a strain to another or others.

If the reader will refer to the commencement of Chapter X. he will see that I there state, "He (man) must first have it (a life-form) produced by nature, and then he can by selection increase it into a family, a strain, &c., with corresponding types, and modify any one of them if he will."

Now, it matters little whether we take a true sport, a pseudo-sport, or a unit that is true to its factors; from any one of them we can form a family on his individual type.

From this family in due time may rise a pseudo-sport that gives birth to another family, and from this a third, &c., which families combine together to form a strain, a new strain, not exactly that to which the prototype of them all belonged; but a modified strain formed just as was the first family on his individual type, on his family type, the whole strain being a new sub-variety of the variety type of the first prototype. If an instance of this is required we have it in the Shorthorn cattle of to-day.

Such a parallel must strike the reader that this is just how the rise took place to species as in Chapter I. In the one case we have the rise of a single unit, original life to species. Here we have a single unit rising in like manner to a strain, and on its way to a species were we to look upon it in cycles of years hence.

Again, it must be obvious that since a first family must arise before another can, &c., one strain before another, there must be precedence in families, strains, &c.

Into the question of further than families I cannot go, since it resolves itself into one which cannot be answered. I am sure, however, that the problems I shall put forward as to families will demonstrate as much as we will require.

Fresh strains are constantly being formed in this way. How often we hear friends say "So-and-so has the old strain," as much as to say all new ones are worthless. This is a mistake. To-day

we breed to a unit, and form fresh strains, whilst to-morrow a new one springs up and takes the public eye; consequently the old strain, although it has the virtue of priority, is no more the correct strain than the one which it forestalled.

Now, the first family of a strain is true to one of the units called in to develop it.

Thus if we desired a strain which was to have the factors A, B, C, D, E, F, G, one of these units would in the first place have to preponderate in the first family, and this unit we call the prototype.

Now A must represent five complete types or be equal to five types, which in other words is equivalent to saying that he may be a pure-bred unit or a mongrel as far as strain and family are concerned. It does not signify what he is, a new family can be formed on his individual type, and a strain modified on that of his family type.

We will, however, assume that A is a pure-bred unit; what then are B, C, D, E, F, G? They are also prototypes, but subsidiary ones which we are going to call in to aid in the development of the strain. A, the prototype, has no factors, neither have B, C, D, E, F, G.

Starting now with this hypothesis, let us construct a family—

A	Prototype
B	Sub-prototype
C	,,
D	,,
E	,,
F	,,
G	,,

Formation of a Strain.

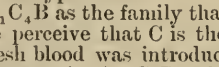
$$A+B$$
$$\downarrow$$
$$Ab+A$$
$$\downarrow$$
$$A_3B+C$$
$$\downarrow$$
$$C_4A_3B+A$$
$$\downarrow$$
$$A''_{11}C_4B$$

A has now increased to a family, the factors of which are $A_{11}C_4B$, and the descent of this family may be represented thus:—

$$\begin{array}{c} A \\ \downarrow \\ (A_{11}C_4B)=A \end{array}$$

This then is family No. 1, but it must not be supposed that this is likely to be the only family A. A may have been forming other families with other of the subsidiary prototypes, in all of which A is of course the type factor.

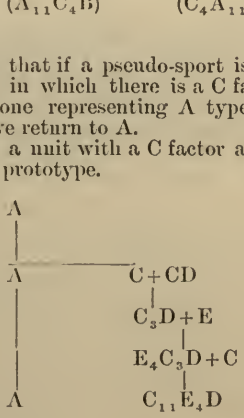
Now if we take $A_{11}C_4B$ as the family that produces the pseudo-sport, we will at once perceive that C is the cause of it, C being the unit by which fresh blood was introduced into the A family. As a result we have a unit $A_{11}C_4B$, which I will now write $C_4A_{11}B$, weakly representing the sub-prototype C, and the condition of the state of affairs may now be represented thus :—



Family of A units $(A_{11}C_4B)$ $(C_4A_{11}B)$ a single unit and a Pseudo-sport.

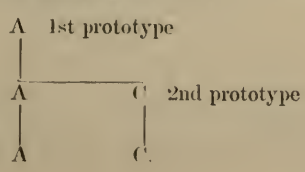
Now we have seen that if a pseudo-sport is cultivated, it must be bred with a unit in which there is a C factor or some other unit, but not with one representing A type (unless we grossly inbreed), otherwise we return to A.

Let us, then, take a unit with a C factor and proceed, looking upon $C_4A_{11}B$ as the prototype.

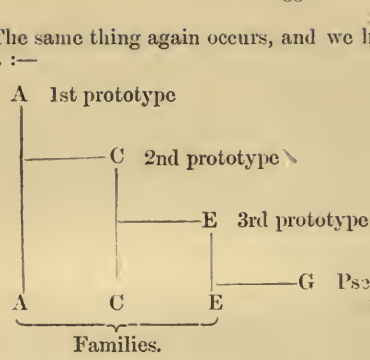


What has now occurred?

A family has gone on increasing by breeding with other A families, and $C_4A_{11}B$, the pseudo-sport, has become a second prototype, as a family has been formed on his individual type, and as a consequence we have a second family added to the new strain, which may now be represented thus, viz. :—



The same thing again occurs, and we have the new strain thus, viz. :—



What is now the condition of things? Why A, B, C, D, E, F, G have risen from single units to a strain with three families, and could be still further increased, and what is the difference in their types compared with the prototype A ?

This :—

A, C, and E remain the same species as A.

,, ,, ,, variety as A.

A, C, E are families of an A strain modified on whatever family A belonged to.

A, C, E differ in family types.

A, C, E have all differing individual types.

A, B, C, D, E, F, G now represent three families and one strain, of which A is the first family, C and E second and third.

Now, unless a man knows what the precedence of these families is, and how they have come about, it is obvious that if he were to go into a show-yard, and one unit took his fancy, should he determine to breed to him he must know what precedence he bears as the unit of a family in the strain that he belongs to, also what was his prototype ; in fact, it is perfectly possible that he might be a pseudo-sport, and second or third, or even fourth prototype.

As a rule, there is generally more than one strain exhibited in classes for a certain variety at shows, and in looking over the exhibits one is pretty sure to observe the following types of units :—

1st. Every one differing in individual type.

2nd. One or two groups of units belonging to differing family types.

3rd. Units belonging to (say) two strains.

4th. Units belonging to two family types and two strain types (bred on the equal-factor system), that is to say, mongrel types.

5th. One or two units that have no particular types at all, except that of individuality.

But if the would-be breeder make use of his pedigree, he may group them, viz. :—

Strain.	Families.	
A	A.C.E	Pure
x	HI	Pure
	AC.CE.EA	Half-bred
Ax		Half-bred

K.L.M., units which cannot be grouped.

He may then tell whether he is breeding for A strain or x strain, and which of their families; again, whether the unit he has decided to breed from is pure strain, half-bred, or quite isolated as K, L, M are; again, whether the unit is prototype 1, 2, or 3, or the pseudo-sport of E family.

It is, indeed, rare to find all the prototypes existing synchronously, for the very simple reason that, as one family must be older than another, the prototypes must be older too; consequently prototype No. 1 in A strain would be dead, C aging, E in his prime, and G, the pseudo-sport, not yet begun to found a family.

The result, then, of getting the precedence of families into proper order is that the breeder can in a moment tell where he is and what materials he has at hand to work with.

CHAPTER XIII.

RATIONAL BREEDING.

We have now come to an end of the questions which interest us, as breeders, and all that remains to us is to see how they may be put to account; but, before doing so, it would be well to run over them again, in order to impress them more thoroughly on our minds, viz. :—

We have seen that, starting with an original unit, "Life," owing to the gift of heredity and the power of variation, numerous species have been evolved, and that every species has varieties, which varieties contain numerous strains consisting of more numerous families, which families are made up of single individuals.

We have seen that one of these species—namely, man—has advanced to a much higher state of life than any of the others, and that, owing to his powers of intellect, he has taken certain of the other species into domestication.

We have seen that every individual unit has five types, but that naturally there is no such thing as "correct type," except it be original life.

We have seen that man defines a "correct type," but that it is incorrect, inasmuch as he has never defined more than two types, and that, were he to define one individual as "correct type," no other unit could ever be again correct, since no two units are or can be exactly alike.

We have seen that one type—viz., individual—must always variate.

We have seen that each type has a distinct value, and putting the value of them individually at $\frac{32}{32}$, $\frac{16}{16}$, $\frac{8}{8}$, $\frac{4}{4}$, $\frac{2}{2}$, we would, if we had these figures, have "correct type." But, as we cannot reach this, we can represent the value of as correct type as we need desire by $\frac{32}{32}$, $\frac{16}{16}$ or $\frac{15}{16}$, $\frac{8}{8}$ or $\frac{7}{8}$, $\frac{4}{4}$ or $\frac{3}{4}$, $\frac{2}{2}$ or $\frac{1}{2}$ (for an individual unit), whilst to establish a family we require $\frac{14}{16}$ or $\frac{6}{8}$ of the prototype.

We have seen that we can do this under the equal-factor system if the species, &c., be the same, but if they be differing we cannot.

We have seen that in both similar and dissimilar varieties, &c., types are promoted by an unequal-factor system; but if this system be abused deterioration, degeneration, and extinction must follow.

We have seen that the antidote to abuse is fresh blood, but that it must be introduced as a factor, not as a whole; otherwise we are breeding on an equal-factor system and destroy existing types.

We have seen that sports are the outcome of nature's habit of variation, pseudo-sports the result of the introduction of fresh blood.

We have seen that selection is a necessity, and that pedigree to be of value and use must be reduced, and the correct position o the families of a strain defined.

These are the main points in the previous chapters, and I have given the reasons in each case; but there are others, too, worthy of notice and attention.

Now, Rational Breeding consists in applying such conclusions to any stock which may especially interest the reader, and in this chapter I shall attempt to place before my reader how he should proceed to ensure success.

First and foremost, we have the question, why does a man commence breeding? Well, the circumstances are manifold; so differing that it would be foolish to enter into them. But when a man does, whether it be for profit, as a business, or business as a pleasure or hobby, his aim is to produce not only a good animal or fowl, but one better than what has been previously produced. This is, or ought to be, the aim of the breeder. Consequently, if he trusts to luck, in all probability he will very soon throw his hobby up. He will not succeed. Breeding, I need not say, is a somewhat deep and intricate subject; there is no specific or royal road to success. As a rule, those who do succeed are men who have devoted years to the art, and who learn, by patience and experience, what others can never learn. One in a hundred may, by some fortuitous circumstance, produce good stock by "luck;" but when we come to look into what has brought this luck about, we see that the lucky breeder has simply been fortunate enough to alight on two units which have the necessary qualities in common to produce good results; but when mated with other units "luck" no longer favours the breeder.

Now, directly a man takes up breeding he has to choose the species he intends to breed and the variety. When he has done this, he has chosen two of the types he intends his future stock shall possess To that would-be breeder I should say, "Pause," the reason being as follows, viz. :—

As a rule, the would-be breeder rushes headlong into the fray; he is exceedingly sanguine of success, and the time arrives, frequently, as I have myself observed, in a year or so, that the hobby is thrown up in disgust, the breeder having failed—miserably failed in his endeavours to produce anything that will repay him for the attention, trouble, and expense he has put himself to. Why? Because he knows absolutely nothing about the variety in question; he frequently is unaware whether his stock is related; whether they belong to the same strains; whether his units are of good type or bad. He is like a man

endeavouring to make a steam engine, to build a house, to bake a loaf, without having served his apprenticeship to the trade.

If we look at it calmly, the idea at once forces itself upon one—how is it possible for a man to succeed when he knows absolutely nothing about the variety in question? How can he expect to produce as good results as others who have had years of experience? A man, I say again, may have a stroke of luck, but to the majority of such breeders it is simply a repetition of the time-honoured adage, "Marry in haste and repent at leisure," and to prevent this education by bitter experience, I say to the would-be breeder, "Pause."

My advice to any man who thinks of entering the field of competition which breeding leads one into is, after having chosen the species and the variety you intend to cultivate, "Learn something about it first. Don't follow your natural inclination to begin at once; if you do, be guided by someone who does know what he is about, who has learned by experience; but, in any case, at once join the club formed for the advancement and improvement of that variety you have selected."

Think for a moment what an enormous amount of good these specialist clubs have done. Remember that it is they who define the variety type; they who codify the necessary points; they who support the classes at shows with pecuniary aid; they who appoint the judges. There are people—generally the unsuccessful—who say that the specialist clubs are cliques, just as there are unsuccessful men in all walks of life who denounce successful men and the societies they belong to, because they have failed.

I do not care whether a specialist club is a clique or not—it is generally a body of gentlemen who have laid down certain points by which the breed is to be judged, and as long as these points are accepted by the majority of breeders, then the breeder, if he intends to be successful, must accept the variety type of the club, the points, and the judges; and he must remember that any stock he may breed will have to be judged according to these rules and by these men.

He must learn what is required of him in his stock, otherwise he may be likened to a man who, having painted a picture, without knowing the rudiments of drawing, sends it before the Hanging Committee of the Royal Academy. It is bound to be rejected.

I say, then, to the would-be breeder, join the specialist club of the variety you intend to breed. Make certain of the variety type; this is the most important. Since no club accepts strain or family, learn the points desired in the variety. In addition to this, visit the shows where classes are given for the variety.

When you are certain of the variety type and points, you may think about commencing.

Now, many would-be breeders commence by buying the male unit first and then the female, making a stipulation that they shall not be related; the result of this being that they must either be units of differing family type or differing strain type.

What happens? The produce is neither one family nor the other, one strain nor another; although it is perfectly possible that, if one unit be more in-bred than another, there will be a bias in the produce towards the family and strain types of the in-bred parent.

Again, the two parents may be selectively unsuited to one another; consequently, they prove unsuccessful, the points in the produce being still more deficient than in the parents.

Personally, I consider it a great mistake to buy a male at all for breeding from when the variety is large, unless the would-be breeder is prepared to embark in some noted sire, then by all means buy one; but it is an enormous mistake to buy a second-rate male to start with, when the services of a first-rate one are always to be had for a small fee. By all means acquire a female, but before doing so, make sure of the male.

Now, supposing that a man has chosen the variety he intends to breed, there opens to him four varieties of breeding, viz. :—

1. Breeding for no type except that of the variety.
2. Breeding for simply strain and variety types.
3. Breeding for family, strain and variety types.
4. Breeding a new family type on the individual type of a unit, who belongs to a recognised family—of a strain of the variety—or in other words forming a sub-family from an existing one.

The first of these varieties can scarcely be called breeding at all. Nor can we say much more of No. 2; but No. 3 does deserve our attention, since it is the means generally adopted in breeding a high class of stock.

No. 4 commands our best attention, as it is the highest form that the art can attain.

I will, therefore, deal only with Nos. 3 and 4, and trust I will place the matter in a clear manner before the reader.

Before commencing, however, I will assume that the would-be breeder has joined the club formed for the improvement of the particular variety he intends to breed, and that, having done so, he has made himself perfectly *au fait* with regard to the points desired in the variety.

So far armed with knowledge, let him proceed to select a sire, and, having chosen his sire, let him make certain of the strain he belongs to and his family; as also the position the family he belongs to holds in the strain.

Now, supposing that the sire belong to A family and A strain, as given in the preceding chapter, and the breeder simply desires to produce good stock (not to improve on it), we have then before us the third kind of breeding that I have mentioned.

Now, supposing that the sire is (A) (I put A within parentheses to differentiate the unit A from family A and strain A, to which he belongs), then all the breeder has to do is, in the first case, to reduce the pedigree of (A), viz. :—

(A) { Ransom
Stella { Master
Venus { Ransom
Fidget { Ransom
Troublesome

We then find that his factors are—

$Ransom_{11}$, $Master_4$, Troublesome.
Which makes Ransom = A,
Master = C,
Troublesome = B.

And as this is the case, then (A) = A_{11} C_4 B, and as A_{11} is the greater factor, A must be the prototype, and consequently the founder of the family type, which the breeder desires to continue.

His next step must be to take note of (A) points, and see where he is + and − the club standard, and having made certain of this, the breeder may look out for the dam, which must be of the same family type, and of course the same strain.

Personally, I should not advise the dam's factors to be identically of the same blood, that is of A, B, and C; let him look for another of those families which I have said in Chapter XII. are also descended from A, and are equally families No. 1.

If the A family be a large one, considerable breeding will have ensued, and the breeder may easily find a female several generations below that of (A), who, being a unit of $\frac{1}{16}$, is four generations from the prototype.

The dam, therefore, may be $\frac{1}{16}$, $\frac{32}{32}$, $\frac{64}{64}$, &c.; but, so as not to complicate the figures, I will suppose that she, too, is a unit of $\frac{1}{16}$, and that she is (B) with the following factors A_{11}, S_4, T, and points + and − opposite to (A).

Here, then, we have a female that will mate, as far as family type goes, with (A), she having a large type factor, and, being of the same strain as the male, will reproduce in her offspring the same strain type. The points also will probably be better than either sire or dam.

Such units the breeder can safely breed together, and the produce would be—

Units.	Factors.	Ind. Type.	Fam. Type.	Strain Type.
?	$A_{22}C_4S_4BT$	(ab)	A	A

the only difference being that of individual type. In like manner we can reproduce units of families C and E, supposing (A) to belong to one of these families.

Supposing, however, (A) to be the prototype, A or C or E, then a female must be found of weak type. A union with the prototype will at once raise it, viz.:—

(A) = A
(A) A
(B) C_4A_3B } $A_{11}C_4B$ = Produce.

We now come to that kind of breeding given under No. 4, in which the hypothesis is that either the prototype is dead and cannot be used, or that one of his descendants is deemed a more perfect creature and is used instead of him.

Under No. 4 I will give three cases, viz. :—

1. Where no deterioration through in-breeding manifests itself in the first cross.
2. Where deterioration does manifest itself, and fresh blood (family) has to be introduced.
3. Where fresh family blood is unattainable, and recourse has to be had to another strain.

In these three cases, as we are breeding to (A) as a prototype, we must employ a new set of factors for the new family ; but, in breeding, we must not forget that although the old factors will not appear here, in each case the type factor of the units bred together must be that of (A)'s prototype, *i.e.*, A, and it is necessary that the selection for points be alluded to.

Case I.	Individual.	Factor.	Ind. Type.	Family Type.	Strain Type.
1st Cross	(A)	α	(A)	A	A
	(B)	β	(B)	A	A
Produce	(ab)	$\alpha\beta$	(ab)	A	A
	Variation in individual type.				
2nd Cross	(C)	γ	(C)	A	A
	(ab)	$\alpha\beta$	(ab)	A	A
Produce	(C_2ab)	$\gamma_2\alpha\beta$	(C_2ab)	A	A
	Variation in individual type.				
3rd Cross	(A)	α	(A)	A	A
	(C_2ab)	$\gamma_2\alpha\beta$	(C_2ab)	A	A
Produce	(A_5C_2B)	$\alpha_5\gamma_2\beta$	(a_5C_2B)	(A)	A

Variation in individual type and a new family type modified on (A).

In the same manner, (A) may be reproduced as a new family if he belong to C or E.

Case II.—Now, it is not improbable that deterioration may have shown itself in the first produce of (A) and (B) ; consequently, instead of going to another individual of the same family, such as (C) in the previous case, we must go to another (C) belonging to family C or E.

Let us, then, suppose it to be C.

In this case, in each cross we will have the same individuals and the same factors as in the last case, and therefore I will not reproduce them all again, but otherwise there will be a difference, viz. :—

	Individual Type.	Family Type.	Strain Type.
1st Cross	(A)	A	A
	(B)	A	A
Produce	(ab)	A	A

Here deterioration has manifested itself; accordingly we bring in fresh family blood, viz.:—

2nd Cross	(ab)	A	A
	(C)	C	A
Produce	(C_2ab)	AC	A

Variation in individual and family type.

3rd Cross	(a)	A	A
	(C_2ab)	AC	A
Produce	(A_5C_2B)	A_3C=(A)	A

Variation in individual type; but as A_3C is sufficient, as we have seen in Chapter IX., to produce A family type, we have returned to A family type, and as (A) is here the prototype, A family type is modified to that of the new prototype (A), and it is therefore (A).

In like manner, new families in C and D may be, if (A) belong to them.

Case III.—Here (a) would be bound to belong to A family, as no other family in A strain could exist; otherwise we should not have to go out, as in this case we must do, to another strain for fresh blood; (C), in this case, would belong to another strain, say, x.

In this case, the individuals and factors will appear the same, and, for the same reasons as in Case II., I will not repeat them.

We have, then, the breeding thus, viz. :—

	Individual Type.	Family Type.	Strain Type.
1st Cross	(a)	A	A
	(B)	A	A
Produce	(ab)	A	A

Here deterioration has manifested itself, and, no fresh family being obtainable, we bring in fresh strain blood from a half-bred.

2nd Cross	(ab)	A	A
	(C)	HC	Ax
Produce	(C_2ab)	A_2HC	A_3x

Variation in individual type, family type, and strain type.

3rd Cross	(C_2ab)	A_2HC	A_3x
	(A)	A	A
Produce	(A_5C_2B)	A_6HC=(A)	A_7x=A

Variation in individual of the units.

Return to family type, as $A_6=\frac{3}{4}$ of A, and as (A) is the prototype, A family type is modified to that of (A).

Return to strain type, A_7x being equal to A, *vide* Chapter IX.

In like manner could C and E family be supplied with fresh blood, if (A) belonged to them, and fresh blood through a strain be deemed advisable.

Now, in every one of the cases I have given of this fourth variety of breeding, it will have been observed that three crosses are necessary to produce a (I.) new family type, (II.) to do the same with a fresh family factor and consequently new individual

factors, (III.) to do the same with fresh strain blood, and consequently, fresh family and individual factors. This, of course, takes a considerable time to accomplish, and it might very well be argued that while the breeder was conscientiously working from (A) up to (a) family type, (A) might no longer be the unit that he desired to have, another unit being fancied. In other words, his years—for it would, in the generality of stock, be a period of years—would have been utterly thrown away.

Were (a) a unit that had never been a sire, it would certainly take a considerable time to get down, as we must, three generations, even with him, the sire of the third, as he has to be; but generally the unit who finds his way to the top of the tree in exhibitions is one of a certain age and has been bred from; consequently, if the breeder knows the variety he has to deal with, as I have ventured to point out that he should, before attempting to begin breeding, he will be aware where he can find a female to mate with (A), so as at once to bring about the produce of the third cross in whichever case he may find necessary.

Lastly, if (A) be a pseudo-sport, such as that which has sprung from the last of the families, viz., E family, we have the means of reproducing him as a family in Chapter X.

I have now but one word to add. Breeding is not a lottery, it is a certainty, and if conducted on a proper basis with a definite object in view, and on such principles as I have endeavoured to show in these chapters, it will repay a rational breeder, and do more to prove that life and its varied forms are not the outcome of laws which man's understanding cannot fathom, but built up upon a definite system of rules and progression such as I have ventured to portray.

THE END.

LONDON: R. K. FURT AND CO., PRINTERS, FETTER LANE, E.C

Every Friday.] Established 1874. [*One Penny.*

THE

FANCIERS GAZETTE

A Weekly Journal devoted to Dogs, Poultry, Pigeons, Rabbits, Cats, Cavies, and Cage-Birds.

◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆

Articles by the Leading Authorities;
Letters and Notes on Current Subjects;
Prompt and Reliable Reports;
Queries answered by Specialists;
Illustrations by best Artists.

◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆

ONLY PENNY JOURNAL DEALING WITH ALL THE FANCIES.

Terms of Subscription :—

(Payable in advance.)

	s.	d.
One Copy, per post	0	1½
Six months do.	3	3
Twelve months do.	6	6
Ditto, India do.	10	10
Ditto, other Foreign Countries..	8	8

Rate for Advertisements :—

Per Line (containing on the average six words)	0	6
Shows, and Stud Dogs :—		
1 to 3 insertions per line	0	6
4 to 6 ,, ,, ...	0	5
7 to 12 ,, ,, ...	0	4
13 and upwards	0	3
Auction Sales	0	9

Discount allowed on series, prepaid.

Per inch in column (12 lines to the inch)	6	0

Contracts made for series.

SPECIAL ADVERTISEMENTS

For Sales, Purchases, or Exchanges, 1 Penny for every 3 (or part of 3) Words.

No Advertisement is received for a less sum than Fourpence. Addresses charged.

Remittances must accompany order.

Address Cheques, Post Office Orders, and Communications to—

The "FANCIERS GAZETTE," Limited,
54 to 57, IMPERIAL BUILDINGS,
LUDGATE CIRCUS,
LONDON, E.C.

Purveyors by Special Warrants to H.M. The QUEEN and H.R.H. The PRINCE OF WALES.

Spratt's Patent

MEAT "FIBRINE" VEGETABLE

DOG CAKES

(WITH BEETROOT).

20s. per Cwt.

Beware of Worthless Imitations.

See each Cake is Stamped "SPRATT'S PATENT" and a "X."

PET DOG BISCUITS.

KEEP THE BREATH SWEET AND THE COAT HEALTHY.

2s. 3d. per 7lb. Tin, 4s. 6d. per 14lb. Tin.

PUPPY BISCUITS.

2s. per 7lb. Tin, 4s. per 14lb. Tin, 20s. per Cwt. Bag.

PAMPHLET ON CANINE DISEASES and Full List of Medicines Post Free.

DOG, POULTRY, and GAME HOUSES and Appliances. Illustrated List Post Free.

"SPRATT'S BISCUITS have many things to recommend them—cleanliness of preparation, purity of meat and flour, friability, and general wholesomeness. All dogs bark in their favour, and all dog-owners who try them swear by them.

"GORDON STABLES, M.D., R.N."

OF ALL DEALERS, OR OF

SPRATT'S PATENT, Limited, London, S.E.

CHAMBERLIN & SMITH'S

MEAT BISCUITS

(SUPERSEDE ALL YET INTRODUCED).

SUPPLIED TO THE ROYAL KENNELS AT SANDRINGHAM.

Price 16s. per cwt., bag included. Special Quotations for 5 cwt. and 1 ton lots.

WORM PILLS for DOGS.

DISTEMPER PILLS for DOGS.

ECZEMA PILLS for DOGS.

TONIC PILLS for DOGS.

MANGE OINTMENT for DOGS.

Above Preparations 1s. per Bottle; Post Free, 1s. 2d.

The Pills named above are packed in specially-prepared bottles, which are sent out in wooden cases, and will keep any length of time. Directions for use with each bottle or box.

IN PREPARING DOGS FOR EXHIBITION

CHAMBERLIN'S DOG SOAP

SHOULD BE USED.

PRICE SIXPENCE PER TABLET.

Boxes Containing One Dozen Tablets, 5s. Per Dozen. Post Free, 5s. 7½d.

PREPARED ONLY BY

CHAMBERLIN & SMITH,

DOG AND PHEASANT FOOD MANUFACTURERS,

NORWICH, ENGLAND.

CAN BE OBTAINED OF ALL CHEMISTS, CORN DEALERS, etc.

UCSB LIBRARY

University of California
SOUTHERN REGIONAL LIBRARY FACILITY
405 Hilgard Avenue, Los Angeles, CA 90024-1388
Return this material to the library
from which it was borrowed.

JAN 13 1997
FEB 11 1998

UC SOUTHERN REGIONAL LIBRARY FACILITY
A 000 616 844 7

Unive
So
Li